Forestry

VETERINARY MEDICINE

OCT 16 1939

NOVEMBER 1939

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VOL. XXXIV
No. 11

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

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VOL. XXXIV NOVEMBER, 1939 No. 11

Published Monthly by the

VETERINARY MAGAZINE CORPORATION

7632 S. CRANDON AVE., CHICAGO, ILL., U. S. A.

$4.00 a year; ped copy 50 cents; Special Issues $1.00

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Public Health and the Doctor

De Kruif[1] in an article on the effect of public health activities on the income of practicing physicians gives some facts that our live stock sanitary authorities and agricultural extension services might well ponder. Writing of Michigan, he states 75,000 examinations of food handlers are made yearly because of public health regulations. The examinations are made by physicians of the handler's choice and the fees exceed $75,000. Over 350,000 school children are sent to doctors annually for correction of defects. The minimum fee for first call is a dollar. Each year the health department laboratories detect more than 7,000 new cases of syphilis. One hundred dollars is a conservative estimate of the average medical fee per case. Yearly the health department distributes free more than 200,000 doses of tuberculin vaccines and other diagnostic or prophylactic biologic products and the physician's minimum fee for administration is $1.00 per dose. This is exclusive of smallpox vaccine, Pasteur treatments and tetanus antitoxin. For premarital examinations, $200,000 is given as a conservative estimate of the physician's fees. These examinations uncover more than a thousand cases of unsuspected syphilis annually for the treatment of which $100,000 is regarded a conservative estimate. Last year the state paid physicians and hospitals $2,900,000 for the treatment of crippled and afflicted children wards of the state. The state distributes free about 60,000 doses of rabies vaccine and 50,000 of tetanic serum annually. The doctors receive more than $110,000 for administering them. Altogether, public health activities send work to the medical practitioners in Michigan for which their fees at the minimum amount to $4,635,000, or an average of more than $1,150 per year for each of the state's four thousand physicians.

In addition, the public health laboratories make, for the physicians, more than 600,000 free examinations yearly. "The state's healthmen toil to lead the people to the practicing physician. They do not want to undertake the care of the sick. They believe this is the doctor's responsibility. . . .

"Not only the State Health Department Laboratories, but in general Michigan's public health services—state, county and municipal—guide the public to the doctor. Public health officers of cities, counties and state keep up widespread, incessant teaching to every kind of group—business men's

[1] De Kruif, Paul. 1939. Public Health is Good for Doctors. *Country Gentleman* 109:10.

clubs, women's clubs, churches, granges, lodges, schools—telling them health is purchasable, telling them to go to their doctors to buy it."

Public health services in this country have been spectacularly successful. The cascading death rate since the turn of the century, supplies incontrovertible proof. Live stock sanitary authorities and the agricultural extension services would be emulating a successful example if instead of attempting to spread the influence of a few hundred whole-time employes to the millions of live stock owners, they delegated the responsibility of live stock disease control to the 10,000 veterinary practitioners where it belongs, and as de Kruif says of the public health service, "know it is their duty to furnish all doctors every weapon they need for the prevention and cure of sickness in all people."

* * * *

Effect of War on Live Stock Demand

The effect of the war in Europe on the demand for live stock products in this country is a matter for much speculation. Following the outbreak of the World War 25 years ago, prices of live stock on the Chicago market fell steadily, though not markedly, for six months, and cattle and hog prices were still lower in 1915 than in 1914. With the beginning of 1916 a sustained and continued rise commenced. The price of hogs reached $23.60, of beef steers $21.50, and of lambs $22.10 in 1919. With the outbreak of the present war September 1st the price of lard and pork increased sharply; however, they had been lower, particularly the former, than at any time in many years. This increase was due not to a prospect of exporting these products so much as to an increased domestic market resulting from shutting off the importation of these products from Poland and Denmark. By the end of the month hogs were back to the August price level.

Immediately upon the outbreak of war, Secretary Wallace released a statement urging caution on the part of farmers contemplating an increased production, saying in part:

"There is little likelihood that any substantial increase in production of the major crops will be desirable, certainly not in the immediate future. In any case the need for increases in supplies can be anticipated in ample time to make any necessary increases in acreages. The production of large quantities of agricultural commodities for which there is no satisfactory market could prove just as demoralizing in wartime as in peacetime."

The effect of the war on the export of horses and mules and on the price of these animals is also problematic. In the first year of hostilities in both the Boer War and the World War, fewer horses and mules were exported and the average price was lower than in each of the years immediately preceding the outbreak of war. Following the first year in each war there was a sharp rise in the number of animals exported and an increase in price except in horses during the Boer War.

The average annual exportation of horses and mules, 1897-1898, was: horses, 34,448; mules, 6,001. The average yearly price was: horses, $135; mules, $74. The average annual export, 1899 to 1902 (the Boer War years) was: horses, 73,942; mules, 28,029. The yearly prices averaged $110 for horses and $89 for mules.

For the years 1910-13 the average annual export was: horses, 29,397; mules, 5,185; at average prices of $142 for horses and $151 for mules. From 1914 to 1918 the exportation of horses averaged 206,185 and mules 69,631, at average prices of $193 and $183, respectively.

It is interesting to note that while at the turn of the century mules were valued at but little more than half the price of horses, during the past 30 years there has been on the average little difference in the price of mules and work horses.

None of the present warring countries possesses any considerable number of mules. Germany has been accumulating reserves of horses by active importation for three years and now possesses approximately three and a half million, according to Wayne Dinsmore, Secretary of the Horse and Mule Association of America. Poland,

at the outbreak of war, had approximately four million horses.

The character of operations on the western front will to a large extent govern the animal requirements. In stabilized warfare, France with two and three-quarter million and Great Britain with more than a million horses can supply the needs of their armies at least until the next farming season. In a campaign involving rapid movement of armies the requirement for horse-drawn transportation would be largely increased.

It is thought that the increased mechanization of armies will not materially modify the proportionate need for animal transportation from what it was during the World War. The increased supplies necessitated by the great augmentation of artillery and rifle fire will probably largely offset increased mechanized transportation, and the great increase in the air service will, with longer-range artillery, add to the destruction of highways and thus impede mechanized far more than animal transportation.

The United States had on January 1, 1939, some 10,800,000 horses and 4,382,000 mules; no surplus of horses and an insufficient number of mules for its agricultural needs. Any material increase in exports, which have been at the near-vanishing point for a number of years, would cause a sharp increase in price. Such a result would be unfortunate, not only for agriculture, but for the horse and mule industry, since it would accelerate the use of mechanical power on farms where such power is uneconomical.

* * * *

It is the control of animal plagues that makes possible our present agriculture; that has enabled our live stock industry to make the vast improvements in breeds of live stock that the last half-century has witnessed. Certainly the productiveness of beef cattle, dairy cattle, swine and poultry has doubled in that period due to the interchange of breeding animals. It would not have been possible without the control of animal diseases exercised by our veterinary service.

Medical Education

There are 67 approved (by the A. M. A.) medical schools in the United States and nine in Canada, and 10 recognized schools of the basic medical sciences (giving the first and second years of a medical course) in the United States and one in Canada. There are 734 hospitals approved for internships and 518 approved for certain residences and fellowships.

The minimum matriculation requirement in five schools is a baccalaureate degree; in one school, four years of specified college work; in five schools, three years of college instruction with a baccalaureate degree at the end of the first year of the medical course. Fifty-five schools require three years of college work, and 11, two years.

A total of 24,215 students was enrolled in the 87 (84 approved and three on probation) medical schools of the United States and Canada for the year 1938-39. In addition, there were 1,273 fifth-year students interning or engaged in research as a requirement for the degree of Doctor of Medicine (former students of schools that require this additional work for graduation). The Woman's Medical College of Pennsylvania, with 100 students, had the lowest enrollment. Among co-educational institutions, the Albany Medical College with 112 students had the smallest enrollment and the University of Toronto Faculty of Medicine, with 798, the greatest. The University of Illinois College of Medicine, with an enrollment of 638, had the greatest number of students of any United States school. From July 1, 1938 to June 30, 1939. 5,290 from schools in the United States and 285 from Canadian institutions received the M. D. degree.

In 1905 there were in the United States 160 medical schools with 26,147 students and 5,606 graduates; in 1910, 131 schools with 21,526 students and 4,440 graduates; in 1920, 85 schools, 13,798 students and 3,047 graduates. Since that time the number of schools has decreased steadily and the number of students and graduates increased each year to 1935 and has decreased somewhat since.

Tuberculosis accounts for about 5% or 6% of our dog cases. The majority are of the human type.—*Institute of Animal Pathology* (London).

* * * *

The Ku Klux Klan Imperial Wizard is James A. Colescott, aged 42—one time veterinarian in Terre Haute—elected June 10, 1939, salary $20,000 a year.

* * * *

The special attention paid to the constitution of the human being in relation to his growth and development and diseases has inspired the creation of special departments in medical schools devoted to the study of constitution and heredity.—*J. A. M. A.*, 113:6, p. 503.

* * * *

Drs. Venable, Stuck, and Beach, San Antonio, Tex., investigating the reaction of bone and tissues to various metals in the fixation of fractures, found that when metals are used in combination or in most alloys, the electrolytic activity set up causes proliferation of tissue and delays bone growth. This reaction is eliminated when a single pure metal is used. Since pure metals are in most cases too soft for practical use in bone repair work, they experimented with various alloys, and found that vitallium, a highly-resistant cobalt-chromium-molybdenum alloy, causes no tissue reaction.

* * * *

New Record in Pulling Contest

A new world's record for heavyweight pairs pulling on the dynamometer was established by the Cedardell Farm pair, Duke and King, on Saturday, September 2nd, at the Illinois Agricultural Association Farm Sport Festival, Urbana, Ill. The record was set by the same pair that set new world's records in 1937 and 1938. Duke, 10 years old, weighed 2,350 pounds; King, 12 years old, weighed 2,000 pounds. The record established was a tractive pull of 4,000 pounds drawn for the full distance of 27½ feet—equivalent to starting for 15 or 20 consecutive times a load of 51,948 pounds on a wagon on granite block pavement.

The source of the veterinary profession is our veterinary colleges, and since no profession can rise above its source, our colleges are the concern of each one of us.—*H. D. Bergman.*

* * * *

Several reports at the Third International Congress for Microbiology, which met in New York City recently, emphasized the fact that microscopic organisms, no less than other animals, require certain vitamins and mineral substances in order to live and grow. Drs. Franklin E. Allison and Francis W. Minor of the U. S. Department of Agriculture, reported on a substance to which they gave the name "coenzyme R," which has been found indispensable for the growth of the nitrogen-fixing bacteria living in the roots of legumes. Azotobacter, another nitrogen-fixing bacterium, requires minute traces of molybdenum and tungsten, according to a report by Drs. Dean Buck and Kenneth Horner.

* * * *

Pathology

As is our pathology so is our practice.—*Osler.*

Unless surgery is built upon a solid foundation of pathology the surgeon is no better than a hewer of flesh and a drawer of blood.—*Boyd.*

The fundamentals of pathology must be studied at the post-mortem table for it is there that the effects of disease are laid bare and mistakes in diagnosis and treatment revealed.—*White.*

* * * *

Then Why Not Change the Title?

The veterinary surgeon is the physician of the farm, the guarantor of the nation's food supply. His functions extend far beyond those surgical duties suggested by his title, embracing the control and eradication of diseases among live stock and the giving of advice on all matters concerned with animal breeding and nutrition as well as various administrative duties.—*The Veterinary Record.*

In the meat industry the producer and consumer are on the average about 1000 miles apart. The packer and the retailer of meats and meat products are merely connecting links between the live stock producer and the consumer of his product. —*Thomas E. Wilson.*

* * * *

Vitamin E and Pullet Mortality

A feeding experiment was conducted to determine if wheat germ meal as a source of vitamin E had any effect on pullet mortality during the first laying year. There was a slight increase in mortality, due to an increased number of pickouts, when 5% of the meat scraps and middlings in the mash was replaced by wheat germ meal. The incidence of leucosis, lymphomatosis and neuro-lymphomatosis was not reduced. Also, the additional vitamin E did not materially affect egg production and hatchability.—*Rpt. of the Div. of Vet. Sci., Mich. State Coll.*

* * * *

Vitamin D Requirements of Calves

Natural whole milk was studied as a source of the antirachitic factor for the vitamin D requirement of calves. The results obtained from the use of 16 grade Holstein calves indicated that the vitamin D requirement is proportional to the rate of gain in body weight. When winter and early spring whole milk furnished the only source of vitamin D, the daily intake of 0.30 to 0.40 U. S. P. units per pound of body weight appeared to meet the requirements of the growing calf when normal plasma magnesium values were maintained. The importance of maintaining the physiologic magnesium demands of calves when studying experimental rickets is indicated. The vitamin D requirement of calves appears to be greater during the summer when receiving summer milk than during the winter when receiving winter milk. The difference in response to summer and winter whole milk has been tentatively associated with a difference in magnesium metabolism. —*Rpt. of the Div. of Vet. Sci., Mich. State Coll.*

Iodine Needed in Dairy Rations

The need for iodine in dairy cattle rations was shown in work completed at the Ohio Agricultural Experiment Station. Their conclusions were that it is important that feeds supply adequate amounts of iodine and that iodine is more important to the producing ability, general health, and reproducing ability of dairy animals than is commonly believed.

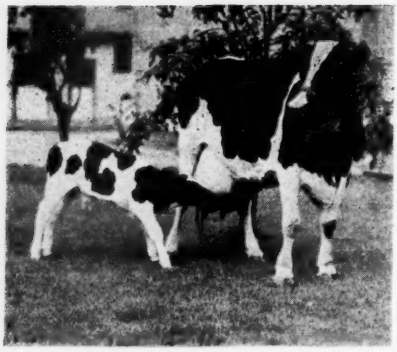
Where iodine was added as potassium iodide it was found that the thyroids of newborn calves contained adequate amounts of iodine, indicating that an iodine deficiency can be overcome in this way. The value of inorganic iodine to meet an iodine deficiency is not a new finding, as it has been demonstrated many times since the work of Coindet, the Swiss physician, in 1820.

* * * *

Beef Cattle Feeding Studies

Though it is possible to sustain feeder cattle on a relatively low plane of nutrition during the early part of their feeding period and then develop them more rapidly later, perhaps by so doing effecting some saving in feed costs, there is a limit beyond which one should not attempt to go in this direction. In studies conducted at the Michigan Agricultural Experiment Station over a period of several years, it was found that calves so fed that they gain less than one pound per day in weight during the first third of their feeding period make somewhat less economical gains during the remainder of their fattening period than those fed somewhat more liberally earlier.

It was also found that, though home-produced rations consisting of shelled corn, silage and alfalfa hay are sufficient to develop and finish beef cattle, the addition of some high-protein feed, such as linseed meal, to the ration results in increased feed consumption, a faster rate of gain, a higher market finish, a higher selling price and a greater net return than would otherwise be realized.—*Mich. Agr. Exp. Sta. Rept.*



A RECORD-PRODUCING COW AND HER CALF

This is Johanna Hester Prilly, a registered nine-year-old Holstein-Friesian cow, who last year broke all world's milk production records by producing 41,414 pounds of milk (since exceeded by a short horn cow); and her bull calf, born July 22, 1939. Johanna was purchased two years ago in a lot at an average price of $80; last year she netted her owners, the Hester Dairy at San Jose, Calif., $2,070.70, and her calf was valued at $5,000 at birth.

Johanna is interesting anatomically in that the external abdominal vein is rather large, and extends almost six inches further forward than normal before entering between the ribs.

Her daily ration consists of 36 pounds of concentrated food (rolled barley, mill run, dried beet pulp, alfalfa meal flavored with molasses, cocoanut meal and linseed meal), 60 pounds of alfalfa hay, five pounds of oat hay, and two hours of pasturage. She is milked four times daily.

The previous milk record of 38,606 pounds was set in 1927 by Carnation Ormsby. Johanna's milk contained 1,221.4 pounds of butter fat.—*Thomas W. Healey, San Jose, Calif.*

* * * *

Treatment of Sterility with Vitamin E

The Department of Chemistry of the University of Witwaterstrand, South Africa, in collaboration with gynecologists and the Faculty of Veterinary Science at Onderstepoort Laboratory, has been experimenting for 18 months in the treatment of sterility in human beings and in the lower animals. It now announces that the results obtained from vitamin E, derived from wheat oil, have been so satisfactory that further systematic tests, medical and veterinary, are to be undertaken. An early difficulty was the tendency of vitamin E to decompose, but this was overcome and a sample six months old proved effective.—*Jnl. A. M. A.*

New Irradiated Yeast Developed

A new type of irradiated yeast, which probably will be of special interest to manufacturers of dog foods, and may have application in other animal feeds, has been made available as a result of research work conducted at the Fleischmann Laboratories. The new yeast, designated as Type 785-F, has the same guaranteed vitamin D potency as Type 7-F, namely 3,200,000 U.S.P. units per pound (7,200 units per gram). Besides this high potency of vitamin D, Type 785-F also carries a guarantee of 38,000 International Units of vitamin B_1 per pound (85 units per gram).—*Vitamin D Digest.*

* * * *

According to estimates of the U. S. Department of Agriculture, about 36,000,000 cattle of all ages were being kept for dairy purposes in the United States in 1938. About two-thirds of these, or approximately 24,000,000, were cattle of six dairy breeds: Ayrshire, Brown Swiss, Dutch Belted, Guernsey, Holstein-Friesian, and Jersey. Of the other one-third, about 8,000,000, or 22%, were cattle of dual-purpose and beef breeds used for milk production, and about 4,000,000, or 11%, were cattle of no particular breed.

* * * *

A New Method of Keeping Milk

In the scientific journal *Nature* [London], J. G. Davis of the National Institute for Research in Dairying has described a new and remarkably simple method of keeping milk. It consists in adjusting the pH of fresh milk to 5.2 with diluted hydrochloric acid and maintaining it at a temperature between 36 and 38°F. The milk may thus be kept for a fortnight or more—three or four times as long as commercial, cooled, pasteurized milk will keep. It may then be brought back to its original pH by adding an equivalent amount of dilute sodium hydroxide and it is said to retain its original flavor. So far the method has been tried on only a small scale, but if it proves equally effective on a large scale it should be useful under many conditions in the milk industry.—*Jnl. A. M. A.*

At least 10 or 12 of the hormones have been isolated and chemically analyzed; all have an effect upon bodily growth and function.

* * * *

The pituitary gland produces two vital secretions. The front lobe of this gland manufactures a hormone which regulates body growth. An over-supply of the secretion of this gland produces gigantism. The tall men seen in the circus are illustrations of this type of disorder.

* * * *

A man nearly naked and with adequate water to drink can maintain a normal body temperature in perfectly dry air at a temperature as high as 250°F. In such surroundings water will boil and meat will cook. When the air is fully saturated with water vapor the highest temperature to which the body can adjust itself, even during rest, is well below 98°F.—*Howard W. Haggard,* in *Science Digest.*

* * * *

The cause of mosaic disease of tobacco was the first filterable virus discovered—if we may apply that term to the recognition of something we cannot see, hear, feel, taste, or smell. Five years later the virus of foot-and-mouth disease was discovered, and in 1921 a filterable virus was first cultured at the Pasteur Institute, chick chorionic membrane being the cuture medium.

* * * *

One hundred sixty-three plant viruses and virus strains have been described. They are spread by contact, air, water, soil and insect. Insects, sap suckers, play a more important rôle in the spread of plant than animal viruses. Although a number of animal viruses multiply in their insect carriers there is no proof that insects act as other than mechanical carriers of any plant virus. Viruses, both plant and animal, are characterized by (1) small size and filterability, (2) inability to multiply apart from living cells, i.e., obligate parasitism and (3) production of inclusion bodies. Some authorities add also the ability to survive for an extended period in 50% glycerin.

The growing of the virus of rabies *in vitro* has been reported simultaneously by Prof. K. Kanazawa, of the University of Tokyo, and Prof. I. J. Kligler and Dr. H. Bernkopf, of the University of Jerusalem. Kanazawa used minced rabbit or chick embryo brains for his medium, and Kligler and Bernkopf a medium consisting of coagulated human blood plasma and mouse embryo brain.

* * * *

Canine Methuselahs

A writer in *The American Kennel Gazette* lists among dogs notable for their longevity Teddy, a poodle owned by Carlin Servals of New Orleans, which died at 29½ years of age; an Irish terrier which lived over 28 years; a small mongrel of the Shetland sheepdog type, 27 years old; an Australian cattle dog, used as a drover's heeler in Queensland for more than 20 years, and living retired at the age of 26 when last heard of; a chihuahua and a schipperke which both attained the age of 24 years; and several other dogs which lived for over 20 years.

* * * *

NOW SEE WHAT MY CHILDREN ARE DOING FOR YOU
VACCINE
IMMUNIZED AGAINST INFECTIOUS SICKNESS
NEW VACCINE MADE FROM EMBRYO CHICKS

Reprinted from the Worthington (Minn.) Globe

Sent in by Dr. L. E. Stanton, Jackson, Minn.

A poultry breeder—Hanson, Corvallis, Oregon—claims the world's all-time, all-breed record hen production of eggs. One pen of 13 layers produced 3,767 eggs in a year; another pen of ten, 3,137.

Five states produce two billion or more eggs per year—Iowa, 2,344 millions; Ohio, 2,216 millions; Pennsylvania, 2,086 millions; California, 2,075 millions, and Texas, 2,000 millions—and five states produce between one and two billion eggs annually—Illinois, 1,895 millions; New York, 1,793 millions; Wisconsin, 1,758 millions; Minnesota, 1,637 millions, and Indiana, 1,470 millions.

The laws of the State of Wisconsin permit vaccination of certain herds of cattle that have been tested for Bang's disease where it is found that 50% or more of the cattle are positive to the test. Such vaccination must be done under the supervision of the Division of Livestock Sanitation and a vaccine of low virulence approved by the U. S. Department of Agriculture must be used. Calfhood vaccination is also permitted in clean herds outside of area-tested counties. —*V. S. Larson,* State Veterinarian.

An interesting condition occurs occasionally in European pigs, in which a raised, livid-looking weal spreads slowly across the body of the pig. It usually commences as a small circle and gradually spreads outward, losing the circular formation.

As the weal spreads, the skin in its wake appears dry, scaly, and scabby. The weal may give the appearance of a shallow crater. Not more than one or two pigs in a litter may be affected. The condition is not fatal. The weal may continue to spread for 10 or 12 days. Pig farmers are of the opinion that this skin condition is of dietary origin. Occasional hyphæ have been found in scrapings; apparently the condition is a form of ringworm. It is readily controlled by one or two applications of a 5% solution of copper sulphate.

The per capita consumption of meat and lard in the United States during 1938 amounted to 139 pounds. This is about 20 pounds or 13% smaller than the pre-war period (1910-14) and is also well below the post-war years prior to the drought years.

Controlled matings of white rats were made and 414 herniated individuals were obtained from a total of 1,058 progeny, clearly showing that umbilical hernia is an inherited character. By selective inbreeding it was possible to increase the percentage of umbilical hernias in litters to approximately 70%. By similar means the size of hernia was increased. The influence of the male and female was of about equal importance in its transmission, and it was not sex-linked.—*Mich. Agr. Exp. Sta. Rpt.*

Studies of the breeding records of a large herd composed of five breeds — Jersey, Guernsey, Brown Swiss, Ayrshire and Holstein—and covering a 10-year period, 1926-35, showed that there is no advantage from the standpoint of breeding efficiency in breeding heifers at a younger age than 17 or 18 months. It was also found that breeding cows so that they will freshen within approximately 12 months is likely to reduce the average number of services required per conception.—*Rpt. of the Div. of Vet. Sci., Mich. State Coll.*

Artificial Illumination for Breeding Turkeys

Artificial illumination experiments on breeding turkeys in the spring of 1938 indicate a stimulating effect of increased hours of light on the mating desires of males as well as on the time of starting and distributing of production with the females. Out of 892 eggs produced from breeding pens in which the males were given artificial illumination starting January 1, the number of infertile eggs was 85, or 9.5%. In the breeding pens where the males received no artificial illumination, there were 141 eggs, or 27.3% of infertile eggs out of a total of 516 that were incubated.—*Rpt. of the Div. of Vet. Sci., Mich. State Coll.*

Home and Farm Accidents Fought by Red Cross

Last year close to 36,000 persons met accidental death at home and on the farm.

To reduce this appalling annual total the American Red Cross in 1935 established a home and farm accident prevention service. Success of this work is shown by the fact that last year's figure is 5,700 less than in 1936.

The Red Cross campaign against accidents is based largely on education, on the principal that accidents can be prevented by knowing what causes them and using common sense in avoiding them. On the farm, such advice is given as:

Farm machinery and animals cause half the fatalities from work accidents in agriculture. Therefore, handle all animals with care and gentleness and teach children to do likewise. Machinery should always be in good running order, properly equipped with adequate guards and should be operated only by those who know how. As some 5,000 persons are killed from burns or explosions in the home each year, kerosene or gasoline should never be used to hurry a fire. Every time someone does this, the grim reaper is close by, ready to take his toll.

This accident prevention service is but one phase of Red Cross activity. There is a well-developed program of service carried on by the organization at all times. Furthermore, future months give promise of much activity in meeting humanitarian demands occasioned by the European war. For those reasons the Red Cross is planning to increase its membership by at least 1,000,000 this year. It will need every member to carry on and urgently invites everyone who believes in Red Cross service to join a local chapter during the Roll Call period, November 11th to 30th.

* * * *

Euthanasia

Euthanasia may be defined as good death, when death seems preferable to life—the right of men to die by their own choice or the choice of others.

Most of us do not subscribe to mercy killing because it makes for an abandonment of efforts to alleviate and cure. No trend could be more unscientific, aside from paganistic implications. Thus the convictions of most of us are expressed by Fishbein's "No civilized country permits murder except in self defense" and Galdston's "Doctors are interested in maintaining life; if society wants executions, it will have to look for them in other ranks." We still feel bound by the ancient oath which all of us have sworn to keep inviolate: "I will follow the system or regimen which according to my ability and judgment I consider for the benefit of my patients and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to anyone if asked, nor suggest any such counsel."

Mercy killing would deprive the medical profession of the very stimulus of research. What is it that impels us to look for methods to prevent suffering in the victims of cancer, diabetes, arthritis and other grievous afflictions? If we were to take the short cut, and end the lives at our disposal, how much progress would there be? It is because we feel our great scientific and social responsibility that we disdain the easy way. We are not challenged to destroy life but to discover ways and means to make it acceptable to men. Slaying the patient will not end disease and suffering; what could be more unconstructive?—*Med. Times.*

Physiological Aspects of Bovine Sterility

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Introduction

The incidence of bovine sterility is very high, especially in dairy herds. From surveys made in different parts of England it has been found that in dairy herds there is a wastage of about 22% of the cows each year. Sterility accounts for about 25% of the cows which comprise this wastage (Wright[1]) and so adds considerably to the costs of milk production. Many of these cases follow outbreaks of contagious abortion (*Brucella abortus*) and infection with *Trichomonas fœtus*, but there are a large number in which no pathological cause can be found. Most of these cases come under the heading of temporary sterility, but the farmer who must keep up a regular milk supply cannot afford to keep these cows for long periods without milk production and so they go to the butcher. It is proposed to discuss such cases in their relation to the normal physiological processes of reproduction.

The Bull

It was formerly considered that a bull was either fully fertile or sterile, but it is now known that all degrees of fertility exist. Slight abnormalities in the cow may be of no consequence when a bull of high fertility is used, but may result in sterility when the bull is of low fertility. Although it requires only one sperm to fertilize the ovum, the chances of any one sperm getting to the top of the Fallopian tube at the right time (just after ovulation) to fertilize the ovum are very small indeed and many hundred thousands of sperms have to be present in the ejaculate before there can be any degree of certainty that the ovum will be fertilized.

The best method of testing a bull is by use of the artificial vagina (Walton[2]); the semen is then collected in a pure state and can be measured. It is not necessary to have a cow in estrus; only a breeding crate to hold the cow still is required (Edwards and Walton[3]). A normal bull ejaculates on the average about 5cc of semen in which there are about 4,800 millions of spermatozoa. A bull of low fertility may, if he has had a rest, produce quite a good sample at the first mount, but with successive services at short intervals the sperm content quickly declines. When testing a bull for fertility this "exhaustion test" is the best one to use (Walton and Edwards[4]). In practice, a bull of low fertility often manages to impregnate every cow served until he is called on to serve a large number in a short space of time, when his defects become apparent.

In addition to measuring the volume and estimating the number of sperms present, by making counts with a hemacytometer, there are other ways of assessing the potential fertility of a semen sample. The opacity of the sample is a rough guide, if microscopically it has been determined that this is due to active sperms and not to leucocytes, for the more sperms there are present the more milky the semen appears (Burbank[5]). In addition some measure is required of the vigor of the sperms; this can be done by measuring the oxygen consumption with a Barcroft apparatus (Walton[6]). A simpler method suitable for field work which has been used by Webster[7] for

[1] Wright, N. C., 1933. Wastage in Dairy Cows. *Scottish Jnl. Agr.* 16:1.
[2] Walton, A., 1933. The Technique of Artificial Insemination. Imp. Bur. Animal Genetics, Edinburgh.
[3] Edwards, J., and A. Walton, 1938. A New Service Crate. *Emp. Jnl. Exp. Agr.* 6:206.
[4] Walton, A., and J. Edwards, 1938. Criteria of Fertility in the Bull. I. The Exhaustion Test. Proc. Amer. Soc. of Animal Production 21:254.
[5] Burbank, R. C., 1935. The Quantitative Standardization of Sperm Suspensions by Means of Opacity. *Quar. Jnl. Exp. Phys.* 25:393.
[6] Walton, A., 1938. Artificial Insemination of Sheep, Cattle and Horses. Holborn Surgical Instrument Co., London.
[7] Webster, W. M., 1938. Recent Advances in the Research on Sterility in Rams. Proc. 7th Ann. Meeting Sheep Farmers, Massey Agric. College, New Zealand, 57.

rams consists of taking an accurate *p*H determination of the semen; active sperm produce much CO_2 and so if there are many active sperms in the semen the reaction is acid, whereas if the sperms are few or inactive and the alkaline secretions of the accessory glands predominate, the semen is alkaline (7.0 or over) and of low fertility.

No completely satisfactory methods for raising the sperm content of the semen have yet been found. It is known that rations deficient in vitamin E cause lack of sperm production (Evans and Bishop[8]) but normally where the bull is receiving greenstuff and bran there is not much likelihood of this vitamin being deficient in the ration: in cases where it is likely wheat germ oil or sprouted oats may be fed. It is said (Smirnov-Ougryumov[9]) that the feeding of rations high in proteins of animal origin, such as milk, meat and fish meal, has a beneficial effect on sperm production. Low fertility often occurs in young, pedigreed bulls which, after being reared on a high plane of nutrition by milk feeding, are sold to go into a commercial herd where they are frequently overused and underfed. Old bulls, on the contrary, appear to suffer most from overfeeding combined with lack of exercise and underuse, which makes them fat and not only slow at service but also of low fertility. Exercise itself is said to increase fertility in bulls (Miller and Graves[10]). The activity of the testes depends on the secretion from the anterior pituitary gland, but, although increase of the internal secretions of the testes and so the amount of secretion from the accessory sex glands and desire for mating can be increased by injections of pregnant mare serum and pregnant women's urine hormones (prolan B), the effects of these on sperm production are negligible. It is possible, however, that the injection of the follicle-stimulating hormone of the anterior pituitary (prolan A) may be found to be of use. Berliner and Warbritton[11] found that they could increase the sperm production of rams in the non-breeding season by injections of this in conjunction with thyroxin, which speeds up metabolism and reduces fat.

The high incidence of bovine sterility is a problem in England as well as in the United States. This paper, which was presented at the 57th Annual Congress of the National Veterinary Medical Association of Great Britain and Ireland, July 23-28, 1939, discusses the causes of non-pathological sterility in cattle in a practical manner.

Semen can be obtained from a bull which is impotent because of sore feet, injury or adhesions to the sheath, etc., by massage of the vas deferens through the rectal wall (Miller and Evans[12]); if the vesiculæ seminales are massaged first and their fluids collected separately this forms a good method of collecting sperms for storage and artificial insemination.

Preliminaries to Fertilization

Normally the semen is deposited in the upper end of the vagina and the spermatozoa obtain entrance to the uterus by swimming through the cervix, which during estrus secretes a thin, watery mucin. Circumstances may arise, such as inflammation in the external *os*, or incomplete relaxation and opening of the cervix during estrus (see below), or incomplete liquefaction of the mucin, which prevent or reduce the number of sperms which obtain entrance to the uterus and so diminish the changes of fertility. The douching with warm bicarbonate of soda solution before

[8] Evans, H. M., and K. S. Bishop, 1923. On the Existence of a Hitherto Unrecognized Dietary Factor Essential for Reproduction. *Amer. Jnl. Phys.* 63:396.

[9] Smirnov-Ougryumov, V., 1937. The Effect of Feeding Conditions upon the Sexual Activity and Sperm Production of Bulls. Problems of Animal Husb. (Moscow). No. 3, 43.

[10] Miller, F. W., and R. R. Graves, 1932. Reproduction and Health Records of the Beltsville Herd of the Bureau of Dairy Industry. U. S. Dept. Agr. Tech. Bul. 321.

[11] Berliner, B., and V. Warbritton, 1937. The Pituitary and Thyroid in Relation to Sperm Production in Rams. Proc. Amer. Soc. Animal Prod. 137.

[12] Miller, F. W., and E. I. Evans, 1934. Technique for Obtaining Spermatozoa for Physiological Dairy Studies and Artificial Insemination. *Jnl. Agr. Res.* 48:941.

service, which has frequently been advocated as a cure, possibly produces its effect firstly by the warmth increasing the natural symptoms of estrus such as the relaxation of the cervix. (According to Zwaenpoel and Royer,[13] warm water in the vagina will cause mares to exhibit symptoms of estrus.) Secondly, it increases the fluidity of the mucus by being a dilute alkali; its effect is probably due to this rather than to any direct action on the life of the sperm. A good sample of semen is usually far more acid than any acidity found in the female tract.

Other, and probably more certain, means of overcoming the difficulties the sperms may meet in the ascent of the cervix consist of (1) an intensification of the symptoms of estrus by squeezing out the corpus luteum, and (2) artificial insemination.

Normally only a small fraction of the sperms in the ejaculate ever reach the uterus, and the vast majority of them remain in the vagina. This is accentuated in such circumstances as have been mentioned above. By inseminating directly into the cervix in such cases, therefore, the chances of fertility are considerably increased. Thus Sorensen[14], who inseminated a large number of cows in Denmark, found that by artificial insemination he obtained a rather higher percentage of fertility than by normal matings, while Siebenga[15] in Holland has successfully treated a number of sterile cows by this method.

If, as frequently happens, the cow fails to cleanse completely after calving and a certain amount of inflammation exists in the uterus, a larger number of sperms than normal will be required to effect fertilization. Spermatozoa are attracted to leucocytes and become agglutinated by them, so that where large numbers of leucocytes are present in the uterus at the time of service the chances of fertilization are reduced. This is again a quantitative action and the more sperms that obtain access to the uterus, the higher will be the chances of fertilization.

The Cow

Recent physiological research has shown that the mechanism of the estrus cycle consists in a delicately adjusted balance between the internal secretions of the anterior pituitary gland and the two ovarian secretions—estrin and progesterone—produced from the follicle and corpus luteum respectively. There are two anterior pituitary hormones which act on the ovaries: one—the follicle-stimulating fraction (prolan A)—causes the follicles to increase in size and ripen, and the other—the luteinizing hormone (prolan B)—causes ovulation and the formation of luteal tissue from the granulosa of the follicle.

Under the influence of prolan A the follicles ripen and the ovary produces large quantities of estrin, which in turn gives rise to the symptoms of heat—the vulva becomes slightly swollen, the cervix becomes relaxed and dilated and the mucosa of the uterus, and especially of the cervix, secretes a thin, watery mucin which lubricates the whole tract and makes ascent of the sperm easy. Incidentally, this is the only time in the cycle when the secretions from the uterus are discharged from the cervix and so is the time when uterine infections can be detected from cervical smears.

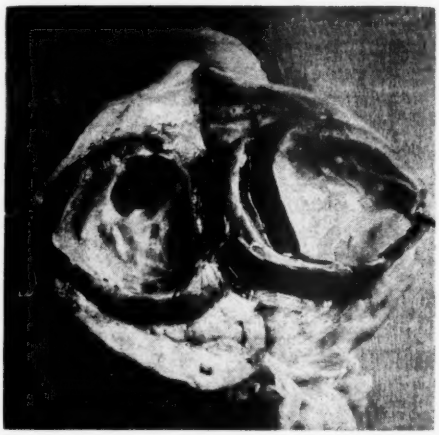
Ovulation normally occurs just after the end of heat, and about 72 hours after the end of heat the flow of mucin becomes opaque by the inclusion of leucocytes and, frequently, red blood corpuscles in the case of heifers or cows in good condition. These are a natural occurrence as a result of the congestion of the tract at estrus and their appearance at this time should not be confused with the pus that occurs as a result of infections at other times in the cycle.

Ovarian Cysts

If, for some reasons not yet known, the luteinizing hormone (prolan B) is not secreted from the anterior pituitary gland when the follicle is ripe, ovulation does not occur and then either (1) the ripe follicle

[13] Zwaenpoel, H., and A. Royer. Technique de l'Elevage du Poulain. Bruxelles.
[14] Sorenson, E., 1937. L'Insemination Artificial et son Importance pour l'Amélioration de la Race. Internat. Cong. d'Agric. The Hague. Sect. 6.
[15] Siebenga, J., 1938. Kunstmatige Inseminatie bij Runderen. Diss. Utrecht.

may go on enlarging and form a large cyst or (2) other follicles may ripen and form a number of small cysts in the ovary. In



Cystic degeneration of the corpus luteum. It will be noted that although the thecal wall is thick, the remainder of the ovary is free from adhesions. The fallopian tube is patent

the first case the cow usually fails to exhibit any further psychological symptoms of heat, although the physical symptoms such as swollen vulva, relaxed and open cervix and a raised tail-head (like a cow about to calve)—all symptoms of the action of estrin—are intensified. A somewhat similar separation of the physical from the psychological symptoms of heat occurs in the so-called still-heats of cows where ovulation occurs without the cow showing a desire for mating (Weber[16]): these are more liable to occur during the winter months. In the second case of small, multiple cysts the physical symptoms are similar but the psychological symptoms of heat appear every few days as each follicle ripens.

Large ovarian cysts can be ruptured by pressure through the vaginal wall. One hand in the rectum is used to bring the ovary down to the top of the vagina from which, because of the thicker vaginal walls, more pressure can be safely put on by the other hand—or, if necessary, pressure from both can be exerted. In cases where the cyst is of long standing and the walls are very tough, or the cyst is small and situated centrally in the ovary, it can be punctured by needle through the vaginal wall by the same technique.

In many cases cysts re-form in the ovaries after rupture. If, however, these newly formed cysts are ruptured some seven to 10 days after the first rupture, then a corpus luteum is formed from the

Retained corpus luteum with small cyst in the center and connective tissue capsule around its periphery. It is best to remove the entire ovary in such cases

granulosa cells and a normal cycle is produced. The cow comes in heat normally about 21 days after the second rupture and if served conception will occur (Hammond,[17] Marshall and Hammond[18]).

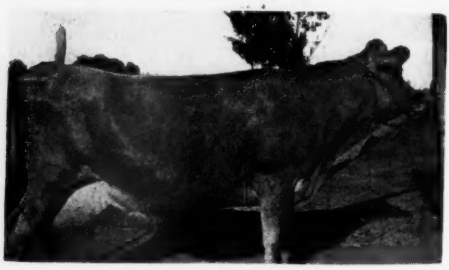
Occasionally cases occur in which the ovary contains a cyst even though the cow ovulates and forms a corpus luteum. Such cows are very difficult to get in calf unless the cyst is ruptured. This is probably caused by the abnormally high estrin secretion from the cyst for it has been found that animals can be rendered sterile by injecting estrin after ovulation; under such

[16] Weber, E., 1911. Untersuchungen über die Brunst des Rindes. *Arch. wiss. prakt. Tierheilk.* 37.

[17] Hammond, J., 1927. Reproduction in the Cow. Cambridge.

[18] Marshall, F. H. A., and J. Hammond, 1937. Fertility and Animal Breeding. Bul. 39, *Ministry of Agric.*, London.

conditions the fertilized ova are locked in the Fallopian tubes and do not enter the uterus (Pincus and Kirsch[19]). If large quantities of estrin are injected at a later stage, attachment of the developing ovum



A case of cystic ovary. The thick neck, masculine facial expression and the voice of a bull indicates the attempted change of sex

to the uterine mucosa is prevented, or if attachment has been made, absorption or abortion of the embryo may be caused (Parkes and Bellerby[20]).

The Corpus Luteum

Under the influence of the luteinizing hormone of the anterior pituitary (prolan B) the corpus luteum remains active until about the 19th day of the cycle when it begins to atrophy and the new follicle begins to ripen. If the ovum is fertilized, however, an internal secretion from it stimulates the pituitary to produce more prolan B and the corpus luteum does not atrophy at the end of 19 days, but persists throughout pregnancy. For some reason, at present unknown, it occasionally happens that this occurs even though the cow is not pregnant; the corpus luteum persists as it does during pregnancy and the cow may go for many months without showing signs of heat, although she is not pregnant. By squeezing out the corpus luteum from the ovary the cow can be caused to come in heat and breed (Hess[21]).

It is generally believed that, when a cow for any reason has been prevented from breeding for some time, she becomes more difficult to get in calf. The reason for this may be that luteal tissue accumulates in the ovaries from successive ovulations and upsets the delicate internal secretion balance of the cycle, leading to less marked physical symptoms of estrus although the psychological symptoms appear as usual. Be this as it may, there is a very large number of sterile cows which have quite regular heat periods, and in which no abnormal anatomical or pathological condition exists; many of these cows can be cured of their sterility by removing the corpus luteum (Hammond[22], Rumianzev[23]. Under the influence of progesterone (the internal secretion of the corpus luteum) the cervix becomes tightly closed and the secretions of the mucosa are dry and sticky so that conditions are unfavorable for the ascent of the sperm.

The corpus luteum is best removed from the ovary between the 8th and 12th days after estrus. At this time it is loosely attached and is most easily squeezed out; before this time it is not fully developed and is too small to get out with certainty, while after this time it begins to sink down into the tissues of the ovary and is then much more difficult to remove. Moreover, if the corpus luteum is removed fairly early in the cycle the progesterone does not have much time to act and the second heat coming shortly after the first keeps the reproductive organs under the influence of estrin and intensifies the physical symptoms of estrus. After squeezing out the corpus luteum, heat occurs usually in from two to six days, and the cow should be mated at this heat. Occasionally, however, the cow does not hold to this service, and if so one more service is usually allowed before the treatment is repeated.

In cows the operation is best performed by inserting one hand in the vagina, using this to pull back the cervix, bring the uterus into easy reach and steady it, while the other through the wall of the rectum grasps the ovary and by steady, continuous

[19] Pincus, G., and R. E. Kirsch, 1936. The Sterility of Rabbits Produced by Injections of Estrone and Related Compounds. *Amer. Jnl. Phys.* 115:219.

[20] Parkes, A. S., and C. W. Bellerby, 1926. Studies on the Internal Secretions of The Ovary. II. The Effects of Injection of the Estrus-Producing Hormone during Pregnancy. *Jnl. Phys.* 62:145.

[21] Hess, E., 1921. Die Sterilität des Rindes. Hanover.

[22] Hammond, J., 1936. When Cows Do Not Breed. *Farmer & Stockbreeder*, April 6.

[23] Rumianzev, N. V., 1938. The Squeezing Out of the Corpus Luteum from Cows' Ovaries as a Method of Curing Sterility. Problems of Animal Husb. (Moscow), No. 10.

pressure from the fingers at the base of the corpus luteum loosens it from its attachment to the ovary. In most cases it is easiest to grasp the corpus luteum within the fingers so that when it is removed it remains within the fingers and the ovary slips back into its place. If this is done it can be felt whether or not the whole of the corpus luteum has been removed, for, if too hard pressure is put on in the center of the corpus luteum instead of a steady pressure around the whole of the ovarian periphery of the corpus luteum, it may split in two and only part may be removed. Complete removal is necessary if the internal secretions of the ovary are to be affected.

In heifers, the vagina is usually too small to admit the hand so that removal of the corpus luteum must be done by one hand from the rectum only. The uterus, however, is smaller and does not obscure the ovary, while the ovarian ligaments, not having been stretched by a previous pregnancy, hold the ovaries within easy reach and so make removal of the corpus luteum easier. The vagina is not merely stretched by the act of parturition; active growth occurs in it during the latter part of pregnancy. It seems possible that this growth is due to estrin in the blood, for in heifers and cows with cysts in the ovaries the vagina is usually enlarged. Incidentally, lack of this growth is one of the causes of difficult parturition.

Ovarian Inactivity

Occasionally in cows and much more frequently in heifers during the winter months the ovary ceases to function and no follicles are ripened. This occurs mainly where the heifers are in poor condition or where they are kept in on dry feed. In such cases follicles usually begin to ripen a few weeks after they have been turned out to grass in the spring. Massage of the ovaries has been recommended in these cases to increase their blood supply and so the amount of prolan A which reaches the ovary. A more efficient means of treatment, however, is by injection of gonadotrophic hormones.

Gonadotrophic Hormones

In addition to the above-mentioned operative means of controlling ovarian function, the injection of gonadotrophic hormones appears to offer great possibilities as soon as standard, pure products are put on the market and when the best dosage and time of injection are worked out.

There is much research work yet to be done in this field, but a beginning has already been made. What I have to say under this heading should, therefore, be considered as an indication of what may be expected from work on other species (Allen[24]) rather than in all cases of established fact obtained from experiments on the cow, such as are given in the previous section.

The follicle-stimulating hormone (prolan A) exists in the pituitary gland of all species, but in most species it is mixed with considerable quantities of the ovulating and luteinizing hormone (prolan B) and so causes not only ripening but also luteinization of the follicles. These two fractions can be separated by chemical means, however, for the purpose of injection (Fevold, Hisaw and Leonard[25]).

The pituitary of the horse, however, contains the follicle-stimulating hormone in great excess with only small quantities of the luteinizing fraction, so that when injected subcutaneously in moderate doses it produces the follicle-stimulating effect only. On the other hand, pregnant women's urine hormone consists entirely of prolan B, the ovulating luteinizing hormone, so that when injected intravenously, it does not cause follicles to grow, but only ruptures and/or luteinizes those that exist in the ovary. Pregnant mare serum hormone consists chiefly of follicle-stimulating hormone.

By injecting pregnant women's urine hormone or pregnant mare serum hormone into cows, Zawadowsky *et al.*[26] found

[24] Allen, E., 1939. Sex and Internal Secretions. 2nd ed. London.

[25] Fevold, H. L., F. L. Hisaw, and S. L. Leonard, 1931. The Gonad Stimulating and the Luteinizing Hormones of the Anterior Pituitary. *Amer. Jnl. Phys.* 97:159.

[26] Zawadowsky, M. M., I. A. Eskin, and G. F. Ovsjannikov, 1935. The Regulation of the Sexual Cycle in Cows. *Trans. Dynam. of Development* (Moscow). 9:95.

that they could bring the cow in heat in about 24 hours and cause ovulation, no matter at what period of the cycle it was injected. Heat periods induced in this way, however, do not change the normal cycle rhythm of the cow, for the cow comes in heat again, not three weeks after the induced heat, but three weeks from the last natural heat period. That is, the corpus luteum in existence controls the length of the cycle; newly formed corpora lutea produced by injection do not take control of the cycle when an active corpus luteum is already present in the ovary. The heat periods induced by prolan B injection, therefore, differ from those induced by removal of the corpus luteum, for in the latter the rhythm of the cycle is changed over to that of the induced heat. Fertility as the result of mating during the induced heat differs also in the two cases. There is usually no difficulty about conception at induced heats caused by the removal of the corpus luteum; but there is difficulty in obtaining pregnancy by matings at heats induced by prolan injections during the cycle because, since the corpus luteum in being at the time of injection controls the uterine changes, the uterine mucosa will usually not be in a fit condition to implant the embryo when it reaches the implantation stage. Where no corpus luteum already exists in the ovary some form of mixed prolan A and prolan B (ox or sheep anterior pituitary or pregnant mare serum) may be used to ripen and rupture the follicles. Thus it would appear that these hormones are suitable to use in the case of cows or heifers whose ovaries are in an inactive state (as is often found during the winter months) or to hasten the onset of estrus after calving. It would appear also that prolan B injected intravenously can be used successfully in cases of multiple cysts where by causing the formation of luteal tissue it will initiate normal cycles again. It has been successfully used for this purpose by Day[27] in mares, but not yet in cows.

[27] Day, F. T., 1939. Ovulation and the Descent of the Ovum in the Fallopian Tube of the Mare after Treatment with Gonadotrophic Hormones. *Jnl. Agr. Sci.*, July.

Follicles may be made to ripen in ovaries which are in an inactive state by the injection of the follicle-stimulating hormone —prolan A—but, so far, the proper dosage has not yet been worked out. If too large quantities are given there is the danger that not one but many follicles may ripen and so cause multiple pregnancies. For example, by injecting 30mg of dried horse pituitary (dissolved in NaOH and neutralized to *p*H 7 :—4 by HCl) per day for three or four days before the normal time of heat in ewes a large number of follicles are caused to ripen. If intravenous injection of prolan B is made as soon as the ewe comes in heat, up to 15 eggs are shed and up to five embryos have been obtained.

After injection of prolan B ovulation occurs in about 30 to 60 hours, so that if fertilization is to be effected, heat and mating or insemination should take place before this time. Under normal conditions heat lasts on the average for about 16 hours, although it may vary from six to 30 hours; ovulation occurs on the average about 27 hours after the beginning, or just after the end, of the heat (Hammond[27]; Gerasimova[28]).

Anti-gonadotrophic Hormones

Recently it has been found possible to produce anti-gonadotrophic hormones (Parkes and Rowland[29], Collip[30]. For example, by long-continued injections of prolan B into an animal the blood serum of such an animal is found to contain antibodies to prolan B—so that injection of such blood serum into another animal will prevent ovulation and the formation of corpora lutea. Quite how this knowledge is to be used in dealing with cysts will not be clear until further experiments have been done. It should, however, be a warning that the wholesale repeated injection of animals with gonadotrophic hormones may aggravate rather than alleviate the trouble of sterility.

[28] Gerasimova, A. A., 1938. Duration of Estrus and Time of Ovulation in Cows. Problems of Animal Husb. (Moscow). No. 12, 126.

[29] Parkes, A. S., and I. W. Rowlands, 1936. Inhibition of Ovulation in the Rabbit by Anti-Gonadotrophic Serum. *Jnl. Phys.* 88:305.

[30] Collip, J. B., 1938. Anti-Hormones in the Pituitary Gland. Baltimore. 268.

Trichomonas Abortion in Cattle

In recent years a new cause of abortion in cattle has come into prominence. It is characterized by early abortion, and is produced by infection with the flagellated protozoan, *Trichomonas fœtus*. Trichomonad abortion is a venereal disease, being transmitted from cow to cow by the bull at coitus. The causative organism was first described in Switzerland by Riedmüller in 1928. In 1932 Emmerson found this protozoan causing abortion in cattle in Pennsylvania. It has since been reported in New York, Illinois, Iowa, Texas, and California. Its complete distribution and frequency of occurrence in the United States are not known, due to the short time which has elapsed since the disease was first recognized. At a veterinary clinic in southern Germany it has been found that one-third of all abortions encountered were due to Trichomonas.

Cause.—The infectious agent, *Trichomonas fœtus*, is a small protozoön possessing three free flagella. It is about 15 microns in length (slightly larger than the head of a bull sperm), and characterized by an undulating membrane running along the body. An axostyle or clear rod runs through the body and emerges at the posterior end as a short "tail." In life the organism is spindle-shaped and swims rather rapidly with a corkscrew motion. It is easily recognizable under the microscope in fresh, wet smears.

Transmission.—Infection is acquired by the bull during copulation and transmitted in the same way. Occasionally it may be passed from cow to cow. It probably cannot live outside the animal host.

Symptoms and Course of Disease.—In the bull, swelling of the prepuce and reddening of the mucous membrane of the penis occur one to two days after infection. A mucopurulent discharge in which trichomonads can be found comes from the sheath. Reddish, pinhead nodules are present on the mucous membranes. These may have grey centers. Painful urination and concomitant loss of desire to mate can be noted. Later these symptoms disappear, although the bull remains infective. From this time on, it is extremely difficult to find trichomonads in the bull's secretions, although they are present. The infection passes up to the epididymis, and probably other accessory genital organs via the urethra and becomes chronic. The protozoa are transferred in the seminal fluid. Often they may not be present in every ejaculation, and consequently every cow the bull breeds will not become infected.

In the cow the course of the disease depends on whether the bull was chronically or acutely infected. The acute infection is characterized on or before the second day after copulation by a marked swelling of the vulva and vagina, with a mucopurulent discharge from the vagina. On the swollen and reddened vaginal mucous membrane, small nodules similar to those of the bull appear. If service is by a chronically-infected bull with but few trichomonads in his secretions, the acute symptoms may not appear. However, after a few days a mucopurulent discharge is observed in which the trichomonads can be found in great numbers. Upon examination with a speculum it is seen that the discharge comes directly from the uterus.

The further course of the disease is the same in both cases. There are four types:

1. *Catarrhal Endometritis.*—In some animals uterine catarrh or endometritis may set in which prevents fertilization. These animals come in heat regularly. They have, especially during heat, a mucopurulent discharge arising in the uterus. In this discharge trichomonads can be found for a few days before and after heat. They may not be found between these periods.

2. *Pyometra.*—In other animals fertilization takes place in spite of the infection. The fetus dies, and is macerated, but not aborted. The cervical canal remains closed, and pyometra sets in. Since the animal does not come in heat, the owner considers it pregnant. On vaginal examination the same conditions as in normal pregnancy are usually found. The vagina feels relatively dry, and

the uterine orifice is closed by a tough mucous plug. However, on rectal examination both horns of the uterus are found to be approximately the same size, the uterus fluctuating uniformly to pressure, and the usual signs of pregnancy are lacking.

3. *Abortion.*—Some of the animals which become fertilized in spite of the infection, after six to 16 weeks suddenly display a copious mucopurulent discharge from the vagina, and abortion follows. Trichomonads can be found in the stomach and peritoneal cavity of the fetus. The discharge has a characteristic stale, sweetish smell. Frequently the cow comes in heat again two or three days after abortion, and often, particularly if the abortion was not noticed, she may be bred again.

Following abortion, the infection may pursue one of two courses. If the abortion was complete (i.e., complete discharge of fetus, fetal membranes, fluid, and placenta), full recovery may occur in a few weeks. The estrual cycle later becomes regular, and after two or three heat periods it is quite safe to breed again. If the abortion was incomplete (i.e., partial or full retention of placenta or uterine fluid), a purulent condition of the uterus ensues (endometritis purulenta). In all these cases a lengthy, intensive treatment is necessary. During the later heat periods, which appear regularly, there is a copious mucopurulent discharge from the vagina. On clinical examination a marked inflammation of the vagina and vulva is usually seen. The mucous membrane is thickened and harsh, and small nodules are present in the vagina, particularly near the uterine opening. Bacteria may be associated with trichomonads at this stage of the disease. In one herd in Illinois streptococci found with the protozoa were found capable of inducing a low-grade catarrh when inoculated alone into virgin heifers.

4. *Normal Calving.*—Exceptionally, trichomonad-infected animals will bear live calves in spite of the fact that the protozoa can be found in the vaginal secretions throughout pregnancy.

Diagnosis.—A diagnosis of trichomonad abortion can be made only by demonstration of the protozoa on microscopic examination of the discharges from the cow or bull, or in the fluids of the aborted or normally-born fetus. A small amount of fluid is placed on a slide, a coverslip added, and the preparation is examined under the low (100x) power of the microscope. The smear must be examined immediately after being taken from the animal. The trichomonads will be seen moving about actively. Although the incidence of this disease in the United States is not known, it is probable that it is not common. Trichomonad abortion should be suspected in cases of early abortion or when abortions occur in herds known to be free from Bang's disease. Unfortunately, a negative microscopic examination of a suspected animal is not conclusive, since the animal may nevertheless carry the trichomonads and be a source of infection. In cows, there is a greater chance of finding the protozoa during heat than at any other time. In chronically affected bulls, it is very difficult to demonstrate the trichomonads, since such bulls may not have them in every ejaculate. Sometimes a cultural method will succeed when direct microscopic examination proves negative.

Prognosis.—In the cow, if the abortion due to trichomonas was complete the infection usually terminates spontaneously. If a chronic condition is present, breeding rest and proper treatment usually effect a cure. Infected bulls, however, seldom lose their infectiousness. Recent work in this country has produced a certain amount of evidence that when an animal recovers, it becomes refractory to reinfection.

Treatment.—German veterinarians recommend repeated flushings of the genitals of the bull and cow with 1:1000 chinosol or entozon solution. Lugol's solution diluted 1 or 2:100, as well as a variety of antiseptic solutions including sodium bicarbonate, sodium perborate, potassium permanganate 1 to 1000, and normal saline have been used in the irrigation of the external genitals of cows and heifers in some cases in this country. Expression of the corpus luteum will usually terminate pseudopregnancy (pyometra), and when the uterus is open, treatment may be applied. In order safely to determine if a cow is free of infection, German veterinarians recommend artificial insemination. This prevents the bull from acquiring the infection. If the cow delivers a normal calf at term and shows no trichomonads on microscopic examination, she may be considered cured. Treatment of a

freshly-infected bull is more successful than of a chronic case. In an infected herd, the bull should be treated even if he appears healthy. The only way to tell if a bull is free of infection is to test him *repeatedly* on healthy, preferably virgin, cows. Owing to the near certainty of infection and the poor prognosis it is seldom advisable to treat bulls in an infected herd.—*Animal Pathology Exchange*, Univ. of Illinois.

* * * *

Acetonemia in Cows

What is the treatment for the following condition in cows? I have had many cows showing the following symptoms:

In the beginning some will lick their lips, or allow the tongue to protrude from the mouth continually; head slightly drawn in the air, as though there were a spinal affection; some walk in a circle right or left when made to move; others lick themselves or chew on fence posts, side of barn, cribs, troughs, etc., after which they keep the mouth in a chewing motion. Animals, while standing, often have a wild appearance and are wobbly on their feet; perverted appetite with nervous symptoms and rapid loss of flesh. These animals seem to have a normal temperature, or probably no more than 102°F. The pulse is irregular and all animals seem to manifest a trembling in some portion of the body.

I have tried every method, such as using intravenous injections with as much as 250cc of 50% solution of dextrose; on others, I have used 300cc of 20% calcium gluconate solution. Orally, I have used alum combined with an ounce and a half of turpentine and saline cathartics.

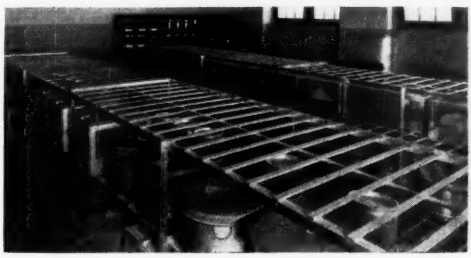
The animals that I have most trouble with are the cows which have calved from four to five weeks, some as long as two months previously; examination shows that they have expelled all their placentæ with no bad effects thereafter.

Is this an after-effect of calving, or is it due to the extremely wet season we have had, or is it due to plant poisoning?

To me, it seems that this is the worst year I have ever had for this trouble, which I have seen for many years. In the past, I have usually had very good success by giving about two or three ounces of alum combined with an ounce and a half of turpentine, repeated in two to four hours if necessary. But I have not had much success the past season with this treatment.—*W. H. W.*

Comment: The condition you describe appears to be acetonemia. This condition can be definitely diagnosed by the Hayden modification of the Rothera test of the urine, as follows: To 5cc of freshly drawn urine in a test tube, add about one gram of a powder composed of one part sodium nitroprusside and 100 parts of ammonium sulphate C. P., and 2cc of ammonium hydroxide solution. If the sample is positive for acetone bodies (ketones) a permanganate color develops and deepens on standing. The reaction is striking and definite.

The treatment giving promptest recovery is the intravenous injection of dextrose. Your dosage of dextrose was too low. Give 1000cc of a 40% solution (C. P. anhydrous granular corn sugar). It is well to add 150 units of insulin to prevent a too rapid loss of the sugar. Chloral hydrate orally in from six (Alston) to 30 (Udall) drams daily is a successful treatment. It may be given in capsules or dissolved in milk or molasses. Affected animals should be placed on a high carbohydrate diet. Adding a quart of molasses to the daily ration will usually prevent recurrent attacks, which are prone to occur if the feed is not changed. You may find many discussions of this ailment in your file of VETERINARY MEDICINE.



One of the laboratory animal rooms in Veranus A. Moore Laboratory, New York State Veterinary College at Cornell University

Studies on the So-Called Corn Stalk Poisoning in Cattle

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FOR a number of years we have had called to our attention extensive losses among cattle that were turned in corn fields after corn husking had been completed. It has been noted that when horses die in certain localities due to the ingestion of moldy, ear corn, cattle are not affected. During these seasons considerable rainfall keeps the corn unusually moist so that when early frosts appear, conditions favorable for the growth of molds prevail. Cattle apparently tolerate the agent associated with the moldy corn which kills horses. However, when directly opposite conditions prevail (dry seasons), many cattle may die when placed in the drought-affected stalk fields in the fall and early winter. During drought conditions the normal development of the corn plant is impaired, and it is usually free from molds. Ear development is retarded in varying degrees, depending upon the severity and time of occurrence of the drought conditions. Horses are not affected during this time. These observations have been confirmed by a number of veterinarians who have been practicing in given localities for many years.

The following is a typical description of a case in cattle:

Rapid, labored respiration; trembling and muscular spasms. When bled from the carotid artery or jugular vein the blood appears a normal red. (This point is of importance from a diagnostic standpoint as will be noted later.) Post-mortem examination shows some subcutaneous hemorrhages of the petechial type. The serous membranes often show petechiæ. Petechial hemorrhages are usually found on the epicardium and endocardium. The lungs are not involved. The liver is swollen, with edges rounded, and presents a cooked appearance. Grossly a focal, intralobular necrosis is suggested. Thick layers of yellow, edematous swellings or infiltration around the gall bladder and the hepatic ligaments usually appear. The kidneys are markedly swollen and degenerated. The capsule strips with ease. Some cases may show hemorrhages in the cortex. The bladder often shows a small number of tiny, red dots. The spleen is not enlarged but its nodules are increased in size. The small intestines present no significant gross changes. The rectum and small colon may show some elongated or strand-like hemorrhages in the mucosa. Petechial spots are usually numerous in the thymus gland. The brain does not appear greatly congested and no necrotic areas are encountered. Death usually occurs after an illness of less than 24 hours, often within five or six hours after the onset of clinical symptoms.

When such descriptions were given us the possibility of the presence of an infectious agent was suspected. However, this was definitely ruled out. Detailed microscopic studies were made of the tissues obtained from field cases. The various parts of the brain and anterior portion of the spinal cord were examined for evidence of bacterial or virus reactions. A few microscopic

*The coöperation of Drs. A. E. Nelson, Essex, Iowa; T. W. Gidley, Malvern, Iowa; C. O. Johnson, Silver City, Iowa; J. W. and R. J. Haxby, Clarinda, Iowa; G. A. Hawthorne, Clarinda, Iowa, and others who have given us assistance is acknowledged.

hemorrhages and slight degenerative changes were encountered; but no changes suggesting the presence of a specific infectious agent could be demonstrated. The changes found in the parenchymatous organs were also of a non-specific nature. They consisted of the conventionally recognized degenerative processes associated with a variety of factors, including toxemias. Cultures and smears were negative. Animal inoculations of brain, liver, spleen, kidneys, blood and lymph nodes failed to produce a reaction. As soon as the cattle were removed from the stalk fields no further losses occurred. Frequently the owners of cattle in these drought-affected areas had little or no other feed available and after a short time returned the animals to the stalk fields. Usually further losses resulted.

Some veterinarians thought they were dealing with prussic acid poisoning. However, corn has not been shown to be cyanogenetic. Chemical analyses made of stalks and leaves obtained from incriminated fields failed to reveal this agent. In the case of prussic acid poisoning the administration of sodium hyposulphite or sodium thiosulphate usually results in a quick response without subsequent relapse. In corn stalk poisoning a similar prompt response occurs, but within a few hours the treated cattle experience a severe recidivation. A second injection produces a less striking response of shorter duration. The cattle so treated die notwithstanding repeated treatments.

During December, 1937, losses occurred in various parts of Iowa and some surrounding states. On a farm near the Institute several steers died while in a corn stalk field. Following the removal of the cattle from this field, no further losses occurred. After an interval of several weeks the owner again turned the cattle into the same field. Another steer died a few days later. Three large truck loads of the stalks were cut by hand and brought to the Veterinary Research Institute. These stalks, which contained a few small ears, were fed to four steers. Straw was avoided as bedding; the animals receiving corn stalks exclusively. After consuming this feed for more than three months the animals showed no distress, although the hair coat was rough, undoubtedly as a result of the nutritionally inadequate ration.

Drought-injured corn, in which ear development is retarded and which undergoes abnormal changes, may be definitely toxic in the late fall and winter to cattle placed in these fields after the corn is husked. The chemical composition of drought-injured corn stalks differs from that of normally maturing plants which develop well formed ears. Apparently the toxic agent responsible for the losses is not stable.

The increased amount of nitrates present in drought-injured corn suggested the possibility of potassium nitrite being a factor in the toxicity, since nitrite is readily converted to nitrate. Because cattle are readily affected by this type of corn, while horses are not, varying amounts of potassium nitrite were fed to several steers and horses through a stomach tube. If the hypothesis of nitrite poisoning were correct horses should prove much more tolerant than cattle.

A horse weighing about 950 pounds was given 100gm of potassium nitrite in one liter of distilled water which was followed by two liters of tap water. The horse died three hours later.

A bull calf weighing about 375 pounds was fed by stomach tube 70gm of potassium nitrite dissolved in one liter of distilled water, after which two liters of tap water were pumped into the rumen. This calf also died in about three hours. Blood collected in a test tube from this animal appeared black. The blood which flowed from the cut vessels of the subcutis was of a chocolate color as it spread over the surface of the tissues. The general picture suggested death due to asphyxiation. The lungs of this calf appeared bluish brown with distended, blue-colored vessels such as are found in anatomical specimens injected with blue dyestuffs. The pericardial sac contained about 50cc of dark, straw-colored fluid. The cut surface of the myocardium showed a yellow and brown mottling. It appeared to be of normal consistency. A strong nitrite odor was detected when the thoracic and abdominal cavities and rumen were opened.

TABLE I—Chemical Changes in the Blood Associated with KNO_2 Poisoning in the Horse

Sample	Time in Hours	Hematocrit %	O_2 Capacity Vol. %	Active Hb %	Whole Blood Cl Mg.%	Serum Na Mg.%	Serum Cal Mg.%	Serum Mg Mg.%	Serum K Mg.%
1 (40gm)	0	34.3	23.0	17.2	262	336	13.8	2.2	25.2
2	1	33.0	25.2	18.8	265	327	13.0	2.2	27.1
3	3½	33.3	18.0	13.9	265	326	12.8	2.2	22.2
4	6	29.9	24.6	18.4	268	366	12.8	1.7	24.1
5	22	33.8	17.5	13.0	265	350	12.6	1.7	27.6
(60gm given immediately after sample 5 was taken)									
6	2	37.6	8.4	6.3	274	396	15.1	2.6	39.9

The spleen appeared only slightly enlarged and the cut surface presented a brown color. The follicles were enlarged. The kidneys appeared dark brown and the capsule stripped with average resistance. On the cut surface no glomeruli were visible. Markedly contrasting dark brown and yellow lines appeared alternately on the cut surface of the cortex. The gall bladder was filled with some slightly inspissated bile containing considerable mucus.

Microscopic Changes Associated with Experimental Nitrite Poisoning

Kidneys.—The epithelium of the convoluted and collecting tubules presented a finely granular appearance. The cell outlines were almost obliterated. A serofibrinous material was present in the lumen. The spaces of Bowman were greatly enlarged. The red blood cells were crumpled and brown in color, suggesting methemoglobinous concentration. The process was very rapid and leucocytic infiltration had not yet begun.

Liver.—The hepatic cords were greatly separated. The nuclei of the liver cells were becoming pycnotic.

Spleen.—This organ showed red blood cells that were of a brownish orange color. Advanced perifollicular congestion was found.

Heart.—Considerable loss of striations was noted. Some nuclei were becoming pycnotic.

Another horse weighing about 800 pounds was fed the following doses of potassium nitrite:

January 5—12½gm
January 11—17gm
February 6—25gm
February 23—40gm
February 24—60gm

Following each feeding the blood appeared black when examined in a test tube. Two hours after the 60gm dose was fed the horse died, showing distended, blue-colored vessels similar to those of the calf which succumbed after receiving 70gm.

The most significant finding in the chemical composition of the blood is the decrease in its oxygen capacity. This can be explained by the conversion of the normal hemoglobin into methemoglobin. The rapid elimination of the potassium from the blood stream is shown by the slight change in the serum potassium.

In general, the findings with cattle have shown a more marked increase in the serum potassium than have those with the horses. This may be due to a more effective eliminating mechanism of the horse.

Qualitative tests on the blood of animals suffering from KNO_2 poisoning have shown that there is very rapid destruction of the nitrite ion. Animals examined immediately after death have a pronounced odor of oxides of nitrogen. The blood of field cases of corn stalk poisoning in cattle show no definite abnormalities that can be observed by casual examination. The blood does not have the bright red appearance of the animals with cyanide poisoning nor the methemoglobin observed in poisonings with nitrites.

The comparatively equal susceptibility of the bovine and equine species to potassium nitrite ruled out this agent as a causal factor in the field losses. Furthermore, the post-mortem picture produced by potassium nitrite is so strikingly different from the changes found in cattle that die while on stalk fields that further efforts to pursue this hypothesis appeared futile.

Potassium Nitrate

The effect of feeding potassium nitrate was also studied to a limited extent, but the large dosages administered without the production of clinical symptoms offered little encouragement. Fifty and 100gm of potassium nitrate were fed to a calf weighing about 400 pounds, but the animal showed no distress. A horse was also fed 150 and 300gm doses of this salt but failed to manifest symptoms.

Summary

During some seasons where drought conditions prevent the normal growth and development of corn, certain substances may develop in the corn plant which are highly toxic for cattle, but apparently harmless to horses.

In many instances the post-mortem findings are suggestive of a septicemic cause. Bacteriologic studies have failed to demonstrate the presence of either virus or bacterial forms. Losses stop when cattle are removed from these stalk fields. The condition cannot be attributed to prussic acid. These cases respond temporarily to the injection of sodium hyposulphite or sodium thiosulphate but a relapse occurs soon thereafter. When the treatment is repeated the response is less pronounced and the affected cattle succumb. Other types of treatment likewise proved of no value in preventing death. Potassium nitrite and nitrate appear to have been eliminated as the causal factors in this condition. The pathological picture produced by potassium nitrite is strikingly different from that encountered in so-called corn stalk disease. The causal factor has not been identified. Apparently it is a labile material because the corn stalks seem to lose their toxicity after being cut or after prolonged field exposure. Usually the drought-injured corn is free from molds and horses are not affected by it. It is only when the corn is moldy that horses are affected. There is no connection between these losses and botulism.

Data obtained from the chemical examination of the blood of affected and non-affected cattle fed on corn stalks showed that in most cases the serum calcium was increased in the affected animals while evidence of a hypocalcemia was found in the cattle not showing symptoms. The experimental feeding of the corn stalks produced a definite rise in the serum calcium with a decrease in the serum magnesium of the test animals. In contrast to the findings in corn stalk disease in cattle is the production of a hypocalcemia and a hypermagnesemia in moldy corn poisoning in horses.

Corn Silage for Dairy Cattle

It is the usual practice to harvest corn for silage when many of the ears have become dented, the bottom three or four leaves and a portion of the husk have become dry while the remainder of the plant is still green. Corn at this stage of maturity is mostly green plant substance and for this reason has been considered a poor source of vitamin D. Samples of corn silage for the years 1931-34 were found to contain from 122 to 165 U. S. P. units of vitamin D per pound of dry matter. The daily ingestion of an equivalent of 7 to 10gm of dry corn silage per kilo of body weight was effective in curing and preventing rickets in yearling calves and also supplied sufficient antirachitic material for normal growth and reproduction in dairy cows.—*Rpt. of the Div. of Vet. Sci., Mich. State Coll.*

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Control of Milk and Butter Production in Belgium

An official licensing system for the control of the production and sale of milk has been set up [in Belgium] in order to promote improvement in quality. To be licensed, the producers must establish to the satisfaction of the veterinary inspector that their stables, cows and methods of production correspond to the following general directions: Milk cows must be free from mastitis and their condition of health compatible with the production of a wholesome, normal milk. Their maintenance with regard to cleanliness must be perfect. The stable ought to contain only cows to the exclusion of calves. The use of fodder and drinking water that might affect the quality of the milk unfavorably is prohibited. Milking must be done into irreproachably clean utensils by careful milkers. The milk must be filtered and rapidly cooled. Receptacles used for delivery must be of one piece, beaten out or welded. If they are plated, the plating must be without defects. They must be handled in such a way as to avoid the risk of injury. Similar control provisions are applicable to the production and sale of butter.—*Jnl. A. M. A.*, 113:8.

An Experimental Study of Homologous Hyperimmune Serum in the Prevention of Acute Dysentery of Newborn Calves

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ALL THE work in this experiment was done at a Government-owned institutional dairy herd. This is a good grade Holstein herd that averages about 250 cows in the milking line.

We call this disease or condition "acute fatal dysentery of newborn calves," because it occurs in calves less than eight days of age, usually in the first five days, and frequently within 48 hours after the calves are born. Affected calves usually die within 12 to 24 hours. They seldom recover with or without treatment. This dysentery, usually referred to as "white scours," is a very thin, watery movement in which there is little or no fecal material. All other types of scours have been considered atypical in this work as they are usually due to overfeeding or indigestion of some kind and usually respond to careful management of the diet.

For a period of at least 12 years this herd has had sporadic losses from calf dysentery that for short periods caused the death of a large percentage of the calves born in the herd. During the last few years this loss has been so severe that the herd has been unable to replenish itself, and a percentage of the replacements has been bought elsewhere. During the first five and one-half months of 1938 the losses became more severe than ever before.

TABLE I. HISTORY OF HERD JANUARY 1 TO JUNE 15, 1938, BEFORE INSTITUTING SERUM THERAPY

Month	Live calves born	Calves dead of dysentery within 5 days	
		Number	Per cent
January	18	14	78.0
February	29	10	34.5
March	4	0	0.0
April	8	3	37.5
May	9	6	66.7
June	1	1	100.0
Total	69	34	49.3

During the above period autopsies were performed on a number of the calves that died and the organs cultured by different workers in the Pathological Division of the Bureau. Two different members of the colon group of bacteria, *Escherichia acidi lactici* and *Escherichia communior*, were recovered in a large proportion of the cases. In March, 1938, we began the process of hyperimmunizing a cow by the use of these two organisms. This process was started by injecting a cow subcutaneously with 5cc of a pooled bacterin from the two cultures. The injections were made subcutaneously, twice weekly until the larger doses were reached, and then the time between injections was extended to once a week. The second injection of bacterin was 10cc, the third 20cc, the fourth 30cc, the fifth 40cc, and the sixth 40cc. After this a live broth culture was used. The cultures were incubated separately for 24 hours and mixed just before they were injected. This, too, was injected subcutaneously twice weekly in the following amounts, 5cc, 10cc, 20cc, 30cc, 40cc, 50cc, and 65cc. At this dosage the time interval was increased to one week and 100cc, 140cc, 180cc, 275cc, 325cc, 400cc, and 500cc administered. Some rise in temperature followed a few hours after most of the injections, but usually subsided in 24 to 26 hours. After the maximum amount of the injection (500cc) was reached a period of about five days elapsed, then blood was drawn and the serum allowed to separate. About 4,500cc of blood was collected once a week and the cow was injected with 500cc of broth culture of live bacteria between the times that blood was

collected. After the serum was separated from the red cells it was filtered through No. 8 Mandler filters and tested for sterility. The serum was then bottled in 100cc serum bottles without a preservative and kept in an electric refrigerator.

The calves were divided into two groups: Group 1 to be treated and Group 2 to serve as controls. Group 1, or the treated group, consisted of all the heifer calves, except those twin to a bull, and an occasional bull calf whose dam had a production record that might make him a valuable breeding animal. Group 2, or the untreated controls, consisted of the other bull calves and heifer calves twin to a bull. The serum was used as a prophylactic agent in the following manner: As soon as a calf could be reached after birth (usually one to 12 hours) it was given an injection of 100cc of the immune serum intravenously. The following day, approximately 24 hours after the first injection, a second injection of 100cc of serum was given intravenously. The importance of giving the first injection as soon as possible will be shown later.

Table II shows the results of this prophylactic treatment from June 15, 1938 to February 28, 1939:

TABLE II. HISTORY OF HERD JUNE 15, 1938, TO FEB. 28, 1939. PERIOD OF SERUM THERAPY

	Calves treated			Untreated control calves		
Month	No.	Died of dysentery	% died	No.	Died of dysentery	% died
June 15-30	2	0	0	5	2	40.0
July	7	0	0	7	0	0.0
August	5	0	0	3	2	66.7
September	6	1*	16.6	8	2	25.0
October	8	0	0.0	4	3	75.0
November	9	0	0.0	9	0	0.0
December	7	3**	42.9	11	5	45.5
January	5	0	0.0	8	1	12.5
February	9	0	0.0	10	0	0.0
Total	58	4	6.9	65	15	23.1

*Treatment not begun until 32 hours after birth when symptoms of diarrhea were marked.
**Treatment not begun until 16th to 24th hour. One showed symptoms of diarrhea.

It will be noted that, in September, 1938, one treated calf died of dysentery. This calf was 32 hours old when it received its first injection of immune serum and had already developed a severe diarrhea. During December, 1938, three treated calves died. These calves died during the most virulent outbreak since the use of immune serum was started. This outbreak lasted about 12 days, and during it six of seven control calves died. All three of the treated calves that died were from 16 to 24 hours old when they received their first injections of serum. One of them had already developed diarrhea. The other two developed diarrhea soon after the first treatment and one died at the early age of 38 hours, before it had received its second injection of immune serum. These three cases and the treated calf that died in September, demonstrate the need for early treatment and indicate that the immune serum probably has no value as a therapeutic agent, but must be used as a prophylactic.

Autopsies were performed on the calves that died, both treated and untreated, and the organs cultured. Colon-group bacteria were recovered in more than 50% of the cases. The two organisms that were used to immunize the cow for production of immune serum, *Esch. communior* and *Esch. acidi lactici*, were the organisms usually recovered, *acidi lactici* being more common. *Esch. communis* and *Aerobacter aërogenes* were recovered occasionally.

The two cultures, *Esch. communior* and *Esch. acidi lactici*, that were used to immunize the cow, have been studied in laboratory animals. The m.l.d. for 24-hour broth cultures of *Esch. communior* in guinea pigs is 1.5cc intra-abdominally and for *Esch. acidi lactici*, 0.5cc intra-abdominally. The m.l.d. for 24-hour broth culture of *Esch. communior* in rabbits is 5cc intra-abdominally and of *Escherichia acidi lactici*, 1cc intravenously. Age of culture from one to seven days growth seems to make little difference in the lethal dose. Bacteria-free filtrates from 24-hour broth cultures of neither culture will kill or produce any noticeable symptoms in guinea pigs in doses of 1cc intravenously or 10cc intra-abdominally. Ten cubic centimeters of the same filtrate, when injected intravenously in rabbits, will kill about 50% of the rabbits and produce severe toxic symptoms in the other 50%. One-half cubic centimeter of immune serum will protect guinea pigs

against lethal doses of *Esch. communior* and *Esch. acidi lactici* when mixed with the culture for one hour before injection. Five cubic centimeters of normal cow serum, obtained from a cow housed in the same barn where so many calves had died did not protect guinea pigs against a lethal dose of either of the two cultures.

Summary

At a Government-owned dairy during the first 5½ months of 1938, 49% of the newborn calves died of acute dysentery before they were five days old. Cultures of *Escherichia communior* and *Esch. acidi lactici* were recovered from a large number of these calves on autopsy. A normal cow was hyperimmunized against these two organisms, and an immune serum prepared. Between June 15, 1938 and March 1, 1939, 58 calves were treated with this serum. Of this total treated, four calves, or 6.9% died of dysentery. During the same period 65 calves were left untreated as controls. Fifteen control calves, or 23.1%, died with dysentery. Colon-group bacteria were recovered from more than 50% of the calves that died.

Conclusion

Homologous hyperimmune serum will prevent heavy losses from dysentery in newborn calves, if given as a prophylactic soon after birth, but probably has little or no value as a therapeutic agent. Guinea-pig experiments indicate that normal cow serum also probably has no value.

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Injury to a Gelding Due to Sadism

History.—The patient was a bay gelding, five years of age, weighing 1500 pounds. It appeared sick in the morning, being very sluggish and showing pain which increased toward noon. The animal had been worked the day before by the hired man. Dr. Kent R. Dudley, Iola, Kans., was called out in the afternoon.

Symptoms.—Temperature 104°F., respiration rapid, starey look in eyes, conjunctivæ a brick-red color, pulse rapid and thready, abdominal wall hard, with evidence of abdominal pain, peristalsis slightly increased, and animal very reluctant to move. There was a bright red hemorrhage from the rectum. A rectal examination disclosed a rent in the upper side of the colon about an arm's length from the anus.

Diagnosis.—Peritonitis, due to injury of sadistic origin.

Treatment.—Four one-ounce capsules of sodium bicarbonate were given, and this dose was repeated every four hours until five doses had been given. An intravenous injection of phe-mer-nite, an organic mercury compound, was made. Movement of the animal was restricted. The owner was instructed to feed a light diet of warm bran mash, with no hay.

Results.—In 24 hours the temperature was down to 102°F., and improvement in all symptoms was noted. Sodium bicarbonate in diminished doses was continued for four days. The horse made an uneventful recovery.

Remarks.—An investigation of the hired man showed that he was a sexual pervert who had been discharged from his last employment because of sadistic tendencies. He was reported to the proper authorities and confessed to having forced a broken pitchfork handle into the rectum of this animal. He was sent to the state hospital for the insane.

In discussing this case with others I find that most practicing veterinarians have had cases resulting from sadism, in cattle and horses of both sexes.

GLEN S. REMSBERG
La Harpe, Kans.

Peculiarities of the Larynx of the Ass

Nearly all veterinarians are aware of the fact that the ass (*Equus asinus*) possesses many interesting peculiarities, one of which is his ability to produce a noise called a "bray." The mechanics of this phonation have not been described in veterinary literature.

The larynx is a short tube which connects the pharynx and trachea. It is a complex, valvular apparatus, which regulates the volume of air in respiration, prevents aspiration of foreign bodies, and is the chief organ of voice (voice-box).

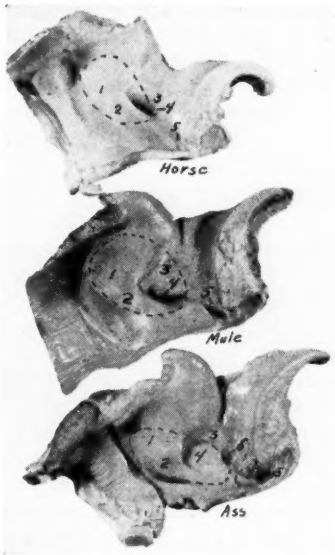
The cavity of the larynx is divided into three divisions, but only one part, the vestibule, is of special interest in this discussion.

The vestibule of the larynx is that part of the cavity which extends from the aditus or pharyngeal aperture, to the vocal folds, true vocal cords. (See 2 in the accompanying illustration.) On its lateral walls are the ventricular folds, false vocal cords (3), each of which consists of a fold or mucous membrane covering the cuneiform process.

Between the true and false vocal cords is a pocket-like depression termed the lateral ventricle of the larynx (4). The lateral ventricle of the larynx is usually described by veterinary anatomists as the pocket-like depression behind the false vocal cord, regardless of whether the laryngeal saccule is present as in the horse, or absent as in the cow, so that it does not necessarily form an entrance into the saccule.

With this thought in mind we find that in the horse and mule the lateral ventricle is mostly occupied by the rather large entrance to the laryngeal saccule. In the ass, on the other hand, the entrance to the laryngeal saccule (6) is a small, slit-like opening, one-fourth inch in diameter and located in the anterior part of the lateral ventricle.

The laryngeal saccule is a blind pocket extending upward and backward from its entrance in the lateral ventricle to lie between the thyroid laminæ and vocal process. Its outline is indicated by dotted lines in the photographs. It will be noted that the saccule is very similar in the horse and mule, except that it is slightly larger in



the latter. That of the ass, however, is directed posterior and ventral to its entrance.

The middle ventricle (5) of the horse is merely a small depression at the base of the epiglottis, and has no special interest. In the mule it extends lateral and forms a pouch almost large enough to admit the end of the little finger. The middle ventricle of the ass leads into two lateral pockets which extend posterior almost to the anterior border of the laryngeal saccule. A fold of mucous membrane (7) forms the dorsal free border of the middle ventricle and appears capable of vibrating. This fold probably serves as an accessory vocal cord acting in conjunction with the true vocal cords to produce the characteristic "bray."

A roaring operation, as performed in the horse and mule, would present additional difficulties in the ass due to the variations which exist in the larynx.

W. O. NELSON.

Horton, Kans.

Calcium in Swine Erysipelas

We were unfamiliar with swine erysipelas until Dr. Glenn Holm, animal pathologist at the University of Idaho, drew our attention to its various forms. Coming from Iowa, he had had some experience with the trouble and hence was a couple of "yumps" ahead of us in diagnosing the ailment.

One trouble was in looking for "diamond skin" disease, when, in reality, we have few cases of this type. As we now understand it, the ailment may occur in three different forms:

1. Acute, in which the skin is mottled, and the victim says good-bye to a vain world in a very short time. It so closely resembles cholera, the differentiation is very difficult.

2. Sub-acute, in which the pigs seem to stop growing, and show all kinds of symptoms. These may range from digestive, pulmonary, cutaneous and nervous symptoms to arthritis and the plain heebee-jeebees, as the owner may term it. A three-months old pig affected with this type looks as if it had been through the siege of Warsaw.

3. Chronic, seen more often in sows and larger hogs. Here, we have enlarged joints, lameness, malnutrition, and finally a quiet country funeral. When little pigs get this type, they cease to grow, and squeal, when handled; sounding like an operatic soprano over the radio.

As said before, we have seen this disease for some time, without diagnosing it correctly because we were looking for the text book skin lesions.

We began treating it as a distinct disease last winter, instead of terming it posterior arthritis, rheumatism or any other ailment. We had fair results in some of the chronic types, especially in sows, because we were supplying them with an abundance of iodine, calcium and phosphorus. However, oral medication was perhaps too slow, and often the patient died while getting well.

Treating a drove of some 80 pigs in all stages of the disease late this spring, we were anxious to help the owner market his animals before the price got too low to pay our bill.

We might say we have a coöperative farm hog pool, to which hogs are brought in every Monday. At 3 p. m., bids are opened, and the hogs are shipped to the highest bidder. The price had been steadily falling.

Of this herd of 80, about 10 were sows; 40 were 80- to 100-pound shotes and the remainder weighed from 20 to 40 pounds. Three sows, 12 larger pigs and about 10 of the smaller ones were lame, and very sore. We suggested knocking about a dozen in the head and burning them, as their condition seemed hopeless.

We gave the remainder serum, and about 25 to 50cc calcium gluconate solution, subcutaneously. They were put on a ration of ground oats, sour milk, coal, alfalfa, tankage, and a worm and tonic powder we fixed up. They were also given a guaiacol solution in their drinking water. A little lye solution was thrown around the pens, but it is hard to get our ranchers to take sanitation seriously.

In about ten days, many of the affected began to "perk up", and the larger ones, especially, made good gains. Half a dozen of the smaller ones which looked as if they had flunked out of college, were destroyed. Of course, we had sunlight and good weather, which are two pretty good doctors in themselves.

The owner was able to market his pigs in good condition, and come out a little ahead on his venture, after paying all expenses. At one time, he would have sold out very cheap.

What we know about swine erysipelas could be printed in a very small book, but we think a deficiency of essential elements, combined with an unbalanced ration, is killing a good many pigs that otherwise might be saved. We also think the serum starts the body machinery to action, and if the owner has sense enough to supply the necessary food elements, many of his animals will return fair dividends. Internal parasites also play a prominent part, and, unless the owner will coöperate, "doctoring pigs" is a rather uphill operation.

E. T. Baker.

Moscow, Idaho

Necrotic Enteritis in Swine

Incident to a feeding experiment with swine, intestinal disorders resembling necrotic enteritis developed in certain lots. Certain supplementary feeds were used with varying success to correct the disease. Striking recovery has occurred when raw liver has been fed. Barley, likewise, had a preventive and a curative influence. The effort to ascertain the substance in barley and liver which cured the digestive troubles has led to supplementing the rations of sick pigs with nicotinic acid. The results have been fully as satisfactory when liver was fed and in some cases more so. Research is now being directed toward ascertaining the nicotinic acid requirement of pigs and the nicotinic acid content of various feedstuffs.—*Mich. Agr. Exp. Sta. Rpt.*

Irradiated Yeast an Economical Source of Vitamin D for Pigs

The results of several recent studies have shown that pigs confined away from sunshine tend to consume less feed per 100 pounds of gain if given adequate vitamin D. The basal diets in these experiments have consisted of grain, plus minerals and tankage, and in some cases other protein-rich concentrates. The savings in feed have ranged from 10 to 92 pounds per 100 pounds of gain.

Under farm conditions, pigs housed during the winter may not receive enough sun-cured roughage to provide sufficient vitamin D. It would appear, therefore, that the provision of adequate vitamin D presents an opportunity to the farmer to grow his pigs to a marketable size more economically, and likewise presents an opportunity to the feed and supplement manufacturer to supply a nutritionally better product.

One quarter pound of Type 7-F irradiated yeast per ton of feed, will provide 400 U. S. P. units of vitamin D per pound of feed. Considered on the basis of an average pig, consuming 750 pounds of feed while being brought to market weight of 200 pounds, the cost of the added vitamin D would be only about four cents.

Porcine Brucellosis

This is a relatively common malady. It has been stated that from 5 to 15% of swine herds are affected. It is usually caused by *Brucella suis,* although other types of Brucella, especially *Br. abortus,* may also affect swine.

Orchitic testicle in a purebred Poland boar. The agglutination titer at this time was 1:25,600.

The causative microbe usually remains localized in various lymph glands, mammary glands, testicles, joints and bones, but an occasional sow may die as a result of generalized infection.

The disease is rarely transmitted from cattle to swine, but there is evidence of its transmission from swine to cattle.

The virulence of the causative microbe or the resistance of swine to this infection varies, or at least the disease is more destructive some years. Some years ago 84 sows of a lot of 120 aborted in three days.

The symptoms of this malady vary according to the localization and may be abortion, metritis, orchitis, arthritis, etc.

The diagnosis of brucellosis is dependent upon the agglutination test. A positive reaction in a 1 to 50 dilution indicates brucelliasis.

The control of this disease is readily accomplished by eliminating all sows and boars that give a positive blood reaction. From one to three tests suffice.—*A. T. K.*

Filterable Virus Diseases of Swine

There is an interesting discussion on filterable virus diseases of swine in volume II of the report of the 13th International Veterinary Congress, pages 736 to 738, by Doctor Gilles de Kock of the Veterinary Research Laboratory, Onderstepoort, Union of South Africa.

European swine fever was recognized in South Africa as early as 1900 and it was suspected that the disease was introduced from overseas. In 1905 Theiler carried on transmission experiments in the Transvaal and was of the opinion that the disease in South Africa was the same as hog cholera in America. The disease did not gain a foothold or at least there was no record of widespread outbreaks in that country at that time. The virulent outbreaks in the northern Transvaal from 1926 and thereafter were considered to be similar to the African virus disease of pigs in Kenya. During the 1933-34 outbreaks in the Western Province, 8,000 pigs died from the disease and 1,900 contacts and 900 survivors were slaughtered. A number of the cases, both in the Western outbreaks and in the Transvaal, resembled European swine fever or cholera.

The lesions were confined to the vascular system and primarily involved the endothelial cells; this is characteristic not only of African and European swine fever, but also of American hog cholera.

The antigenic relationship of the African and European virus was studied and it was found that when a small dose of African virus was incubated with European antiserum and then injected into susceptible swine, no disease developed, although these same pigs were later shown to be fully susceptible to the African virus. Thus, it is evident that there is a relationship between African and European swine fever.

If the original virus was the European strain, why has its virulence been reduced? Is it possible that the passage of the virus through the African wild hog has reduced its virulence?

In the South African investigations it became apparent that virus diseases of pigs may be complicated with secondary bacterial infections. Thus, Salmonella and Pasteurella were isolated from pigs in the Western Province outbreaks. However, bacterial complications seem to disappear in the later stages of the disease. Every pig that died in swine fever experiments at Onderstepoort was examined, and although *Esch. coli,* staphylococci and streptococci were often isolated, no specific pathogenic organisms were found excepting in the early stages of an outbreak and in one enzoötic of paratyphoid.

The following problems are now receiving the attention of the South African investigators:

To what extent does an uncomplicated virus disease occur? How often is it complicated with secondary organisms? To what extent do bacterial infections occur in the absence of virus? Can virus be transmitted and maintained in laboratory animals? Are recovered animals carriers? (It has been found that recovered animals may be carriers for a period of 10 months.) Are wild hogs a factor in spreading the virus?

The ultimate eradication of South African swine fever by the slaughter method seems possible, for by this method South Africa has been free of the disease at intervals for a considerable time.

Immunization experiments by the use of serum and virus gave negative results.

Swine influenza, a widespread disease of swine in the United States, has not been identified in South Africa.—*A. T. K.*

* * * *

Vesicular exanthema in swine is a condition involving swine and transmissible to the horse. So far as is known, this disease at present is confined to California. It is a specific disease and has been identified in California since 1932. Vesicular exanthema is characterized by vesicles on the snout, lips and digits, and there is usually lameness due to soreness in the feet. It is similar, clinically, to foot-and-mouth disease; as is also vesicular stomatitis.—*A. T. K.*

"Orphan" Pigs

One of the serious consequences of agalactia in sows is the loss of the suckling pigs. The artificial feeding of the pigs is economical not only in pure-bred, but also in grade animals. To abandon such pigs amounts to charging off as a loss the cost of feeding and caring for the sow for six months; not an inconsiderable item.

It is advisable in the feeding of any young mammal to provide a food that approximates as closely as possible the composition of the dam's milk. The approximate composition of the solid components of sow's milk is: fat, 7%; albumin and casein, 6%; sugar, 5.7%, and ash, 1%. The fat globule of sow's milk is about one sixty-fourth the size of the fat globule of cow's milk, and is therefore more easily digested. The milk production of sows averages from four to seven pounds daily. The average litter comprises from eight to 10 pigs. Therefore, the pig consumes on the average about one-half pound of milk per day.

In caring for "orphan" pigs they should be permitted, whenever possible, to suckle another sow at least once or twice; they can then be fed a modified milk. A modified milk that has been fairly successful in supplying pigs for which the natural supply has failed is prepared as follows:

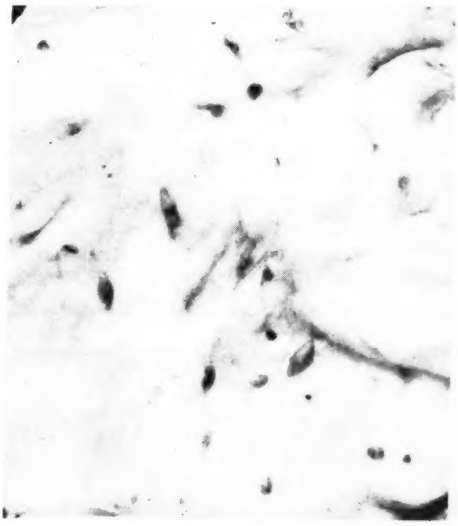
1 lb. cow's milk
1 lb. lime water
¼ lb. separator cream
⅛ lb. sugar

If milk sugar is available and not too expensive, it is more satisfactory than cane or beet sugar. Next to milk sugar, corn sugar is the one of choice. The ingredients should be mixed in clean, sterile vessels, and all utensils used should be cleaned and sterilized by boiling daily. Pigs from one to 10 days of age should be given approximately one-half pound divided equally into four or five daily feedings. It is not necessary to provide a nursing bottle. If the milk is supplied in shallow vessels, pigs soon learn to drink.

The basic principle that pigs should not gain in weight until they are 10 days of age should always be kept in mind when feeding "orphans." After the pigs are 10 days old, the composition of the prepared milk can be gradually changed by reducing the lime water, cream, and sugar, and by the time the pigs are three weeks of age they may be fed whole milk from the cow. Pigs from two to three weeks of age should be given small quantities of grain.

By following these general directions, thousands of pigs can be saved annually.

VETERINARY MEDICINE will be glad to have suggestions as to the treatment of agalactia in sows and other domestic animals and the care of mammalian "orphans."—*A. T. K.*



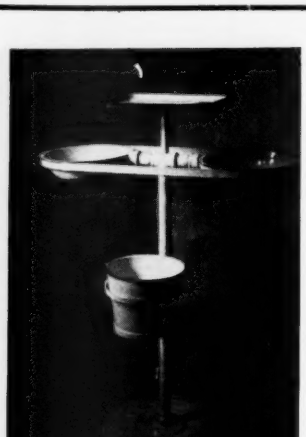
AN UNUSUAL SPECIMEN

The illustration shows a piece of leaf lard, comprising the peritoneum and underlying fatty tissue. Deposited beneath this peritoneum are to be seen a number of grains of oats and small kernels of wheat. The hog from which the specimen was obtained being one of a number killed at a local abattoir, no history is available, and the condition was unsuspected until evisceration took place. Apparently the animal had suffered a ruptured intestine or stomach at some time during its life and complete recovery had followed. The undigested kernels of grain and husks were deposited on the external side of the peritoneum, and the peritonitis which surely must have existed, subsided with the restoration of apparent health to the hardy individual. Unfortunately, the viscera, which showed no signs of inflammation at the time of evisceration, were not obtained for further examination to determine where the rupture had occurred.—*G. H. Keown, Vancouver, B. C.*

Homemade Combination Basin and Instrument Stand

Designed and built by the writer, this combination stand has in practice proved to be very useful and practical. The fact that it is constructed almost entirely of standard water pipe fittings (ungalvanized) at a total cost of $7.15 for fittings, hired labor, etc., immediately appeals to the mechanical enthusiast. If the reader's workshop is equipped with a power-driven drill press, he then requires the services of a mechanic only to weld a few joints (described further on) which can be carried to his shop, and thus greatly reduce the cost of this operation.

Every veterinarian has many friends in his community; therefore, procuring a metal base as shown in the accompanying photograph, should present no difficulty. The strap iron is easily obtained at any blacksmith or machine shop; the upright pipe stand and other fittings, including casters, can be purchased of the local plumber, hardware dealer, or (as was done in this case) of a mail order house. The enameled basins, bucket and tray are standard articles of commerce. Each of the basins cost forty cents, and the tray and bucket were purchased for sixty cents apiece, all on the local market.



This homemade basin and instrument stand saves $25.00 and at the same time caters to the yen for construction.

The hoops of strap iron (see list of materials) were first shaped around a circular body of the proper diameter to accommodate whatever size basin is to be used, and the two ends welded together. Each hoop was drilled to receive two bolts, as shown, which are in turn secured to the stand by drilling two corresponding holes through the off-set metal blocks and the pipe caps which are placed on either end of the cross arm. When these are set in their proper positions, the bolts are drawn up tight with a large screw driver, setting the burrs snugly against the inside walls of the pipe caps, and then welded into proper alignment. Of course, the bolts can be eliminated and the entire assembly welded into one piece, but the former method will be found more satisfactory for the embryo engineer. The stay rods which can be used for a towel rack too are welded into place as shown. The tee fitting on the end of the upright shaft is drilled, then tapped to receive a standard ¾"x6" pipe nipple which becomes the support for the instrument tray (or a similar reducing four-way fitting can be used, if obtainable), on the end of which will be seen a metal floor flange. Cross pieces made of 1"x⅛" strap metal, cut and shaped to fit the tray, are first riveted on and then welded. The cradle hoops for the waste bucket were shaped as described above, and are made of ⅛"x¾" strap iron, the complete assembly then welded before attaching to the standard with through and through rivets.

While the stand as shown weighs seventy-five pounds, by virtue of the two-inch all-metal ball-bearing truck casters (which are fastened to the base in a triangular position, with machine bolts, to facilitate an even keel at all times) it is quite easily moved about the office into a convenient position beside the operating or treatment table.

When compared with the purchase price (about $32.00) of the two pieces of commercially built equipment that this one stand replaces, the matter of economy is a dominant factor,—entirely discounting the personal pleasure and satisfaction derived by the handy-man builder. The actual construction labor is not considered, although $1.50 included in the above was paid a mechanic for welding.

Other than the finish, the stand is now practically ready for trial. Needless to say, rough marks left by the pipe wrench and vise are removed with a file and then sandpapered, after washing all grease and oil off with gasoline or some other oil solvent. Aluminum paint (or other suitable metal flat paint) is then applied to bring out a smooth glossy finish and a good grade of metal or automobile enamel then applied. If two or more coats of enamel are desired to improve the appearance, each preceding coat should be lightly sandpapered to facilitate adherence. Each coat should be laid on with a fine brush, smoothing out a thin film coating to prevent rippling; the work being done in a warm room free of dust and drafts.

LIST OF MATERIALS, ETC.

1 metal base 19½" in diameter (could be slightly smaller or even larger)	
3 truck ball-bearing casters	$0.45
1 piece of pipe 1¼"x37" (or whatever length necessary to make desired height to suit the user)	.42
1 1¼" tee	.25
2 1¼"x4" nipples	.20
2 1¼" pipe caps	.26
1 ¾"x6" nipple	.07
1 ¾" metal floor flange	.21
2 ⅜"x1½"x1" metal off-set blocks	.10
4 1"x3/16" round head machine bolts	.08
12 ½"x3/16" round head machine bolts	.09
2 ⅛"x2¼" round head rivets	.04
2 ⅛"x¾" round head rivets	.04
1 enamel bucket	.60
2 enamel basins	.80
1 enamel tray	.60
14 ft. 1"x¼" strap metal	.52
9 ft. ¾"x⅛" strap metal	.22
Aluminum paint, enamel, ½ gal. gas for cleaning, sandpaper, etc.	.70
Labor for welding	1.50
Total cost	$7.15

H. D. PRITCHETT.

Doylestown, Pa.

Canine Catering

The problem of feeding a city dog a nutritious, well-balanced ration is one which many dog-owners find irksome. From this simple circumstance sprang the latest branch of the dog-food industry—canine catering—which is now flourishing quietly in many cities.

A few years ago LeRoy Goff Jr., who has the distinction of being the father of this unusual industry, started feeding a few dogs as an accommodation to dog-owning friends. Presently he found that many persons were willing to pay for such a service, and that, somewhat to his own amazement, he had a business on his hands. Today, he is the largest beef buyer in his city, delivering meals to 4,000 dogs, 300 cats, and a small number of other pets, including monkeys, raccoons, and guinea pigs.

Goff offers two types of service, table d'hôte and a la carte. The table d'hôte meal, put up in a paper tray container covered neatly with waxed paper, consists of lean meat, vegetables, broth made of the liquid in which the meats and vegetables were cooked, with tomato juice added, and crouton crumbs, the proportions and amounts varying with the individual dog. Variations of this are the "protest meal," for dogs with large appetites and not-so-large pocketbooks, consisting of fresh ground beef, beef-and-vegetable broth, and a concentrated food approved by veterinarians; and the "aspic meal," with pink meat and bright vegetables combined tastefully in clear jelly.

A la carte service provides meats by the pound—beef, beef heart, beef kidney, beef suet, chicken, lamb, or tripe. Special diets are provided for puppies and invalid dogs, after consultation with a veterinarian.

Once a week, Goff throws in a bone for the dog to chew on. This is specially cut for cleaning the dog's teeth, consisting of a piece of shin bone about four by one and one-half inches long.

Canine catering may furnish plenty of ammunition for the ye-gods-what-nexters; but it is making good profits for Mr. Goff and his imitators.—*F. E. Kunkel.*

Tetrachlorethylene as an Anthelmintic for Small Puppies

By LEON F. WHITNEY, Auburn, Alabama
Alabama Polytechnic Institute, Class of 1940

TETRACHLORETHYLENE is considered a somewhat dangerous drug, and its use in young puppies is often advised against. Possibly this has been because of inadequate knowledge as to its effects. Possibly because of ill effects observed in older dogs, the natural conclusion has been drawn that even more drastic results would follow the administration of the drug to small puppies.

Much work has been done to determine its limits of safe administration in mature dogs, but I can find no similar experiments in young puppies.

The importance of finding a safe anthelmintic for worming small puppies, especially those infected with hookworm, can hardly be overestimated. As everyone working in the field of dogs, especially those in the southern sections where hookworm is prevalent, well knows, everlasting vigilance is required, if success is to be had in rearing young puppies. The emaciated, scrawny, anemic appearance of puppies, when they reach the age of about three weeks, is familiar to everyone working with dogs. By the time they have reached this condition, there is usually very little that can be done for them. Because bitches' milk is practically devoid of iron, the drain from the hookworms, each of which is drawing a drop of blood every few minutes, is very great. No iron gets back into the system, and the original supply is quickly exhausted, so the hookworm infested puppy generally dies.

Chenopodium, while an efficient expeller of roundworms, seems to be no more than 50% effective against hookworms. To do an efficient job of worming requires at least 12 hours starving and this again weakens the puppy and does not accomplish desired results anyway. Something, therefore, has to be found which will be an effective hookworm expellent even in these puppies.

On repeated tests, I have found tetrachlorethylene generally causes death within a few hours when given to badly anemic, hookworm-infected puppies. Probably some of it is absorbed through the thin intestinal mucosa, which has been injured by the lesions caused by hookworms and this, coupled with their lack of resistance, makes the use of this drug, when they are far gone, too dangerous for consideration.

But if the anemic condition could be anticipated, I felt the puppies might be saved. Those who have noticed such puppies will remember that they lose condition very rapidly. In my experience not only has tetrachlorethylene not proved dangerous for puppies before they became emaciated and anemic, but relatively large doses of it can be borne safely before this condition set in. Experiments were undertaken with uninfected puppies first. No glucose was administered in any of the tests undertaken. I proceeded gingerly, because of frequent warnings that small puppies cannot tolerate tetrachlorethylene.

Three mongrels were treated at the age of two weeks; after only 18 hours' starvation, with tetrachlorethylene, giving 1cc for each 10 pounds of body weight. A 1cc graduated syringe was used for all measurements and the fluid was placed in suitable hard gelatin capsules. To make sure that the capsules had not been vomited the breath of the puppies was smelled after about 10 minutes and the odor of the drug could be detected easily at each exhalation. These three puppies were given doses of milk of magnesia at intervals of one hour, two hours and three hours respectively, after administration of the drug. None of them showed any ill effects from the tetrachlorethylene.

Following this indication of the safety

of the drug, two litters of puppies were wormed the day that the first of them showed hookworm ova in their stools. This was at the age of two and a half weeks. Half of each litter were removed from their mothers and starved for 18 hours, wormed and returned. Not a single pup showed any ill effects. Next day the other half was similarly treated. Since then it has been my practice to make fecal examinations frequently of all my puppies and as soon as a hookworm ovum is found, to worm the litter, using tetrachlorethylene in a dosage of 0.1cc, or larger, per pound of body weight. Otherwise to wait until the puppies are four weeks old and then give a routine worming. This treatment has now been carried out with several hundred puppies. Twenty-four hours fasting is generally recommended for grown dogs, but food takes a shorter time to move through the intestines of a puppy. By feeding charcoal and timing the interval which elapses between administration and recovery of the charcoal it was indicated that 18 hours is ample time to fast a puppy before giving it anthelmintic treatment.

Lampson has shown that a mature dog, starved until his alimentary tract is empty, can tolerate 6cc of tetrachlorethylene per 10 lbs. of body weight, with no damage to the liver, nerves or intestinal mucosa. On the basis of experiments, it now appears that not only is a dose of 1cc for each 10 pounds of body weight a safe dose for small puppies, but that they too can tolerate a much larger dose without ill effects, provided they are in sound condition.

Two groups of mongrel puppies were starved from 5:00 p. m. of one day until 1:35 p. m. the next, at which time this drug was given to one after the other. One group consisted of three male pups six weeks old, and the other five pups, three males and two females, also six weeks old. All but one were in good condition. The latter litter was poodles, and the former larger sized mongrels.

Table I gives the results obtained when tetrachlorethylene was administered. These pups had been fed ground hamburger at 5:00 p. m. January 14, 1937; no water or food afterward until after the treatment. All were heavily parasitized with hookworm (*Ancylostoma caninum*) and some roundworm (*Toxocara canis*).

The tetrachlorethylene was administered between 1:35 and 1:55 p. m. Shortly after

TABLE I.

Puppy	*Sex*	*Weight*	*Dose*	*Cc to oz.*	*Cc to 10 lbs.*	*Time p. m.*
A1	M	19 oz.	0.50cc	1: 38	4.2	1:35
A2	M	30 oz.	0.50cc	1: 60	2.6	1:39
A3	F	31 oz.	0.33cc	1: 93	1.6	1:42
A4	F	28 oz.	0.25cc	1:112	1.4	1:47
A5	F	31 oz.	0.20cc	1:155	1.0	1:50
B1	M	71 oz.	1.50cc	1: 47	3.4	1:53
B2	M	64 oz.	0.80cc	1: 80	2.0	1:54
B3	M	60 oz.	0.66cc	1: 90	1.6	1:55

puppy A1 was somewhat intoxicated and soon all of the puppies lay quietly. The tetrachlorethylene was noticeable on the breaths of all those, indicating that it had not been vomited. The only puppy that was seriously affected was A1, and while it continued to lie down it could sit up when it wanted to. At 2:35 p. m. all the puppies were given capsules containing saturated solution of epsom salts. At 3:00 p. m. they were all eager to eat and even A1 ate a good meal, although it had to be held up while it did so. The eight puppies consumed one quart of food.

Fecal examinations two weeks later showed that the anthelmintic had been effective in all cases, there being very few hookworm eggs and no roundworm eggs evident.

In this experiment tetrachlorethylene was given to these little puppies at a rate considerably higher than 1cc per 10 pounds of body weight with no ill effects, and only in the case of a puppy badly out of condition were the effects at all alarming. Careful autopsies were made on all these puppies when they had completed their growth. Macroscopically and microscopically all of their organs appeared normal.

It would seem that here is an appropriate place to mention the question of feeding fat, before and after the administration of tetrachlorethylene. On the basis of my experience it need not be withheld from dogs which are to be wormed with this drug as some advise. My results show that a food can have a high fat content and still

not be harmful, if there is a period of fasting prior to giving tetrachlorethylene. The milk of bitches has a far higher fat content on a dry basis, than anyone would be likely to feed to a dog. It is in the neighborhood of 45%. And yet, when puppies are taken from the mother and fasted for 18 hours, no ill effects have been observed in strong puppies.

Feeding fat in the first meal following the cathartic which follows the tetrachlorethylene, seems to be harmless. For instance, to the puppies mentioned last, the following mixture was being fed as a test ration, with good results.

2 15-oz. cans evaporated milk.
½ pound raw ground beef suet.
½ pound raw ground lean beef.
1½ pints of water.
½ pound prepared dog food.
Mineral mixture.

Even the high percentage of fat in this ration was harmless to the puppies, All ate it until their sides stuck out like footballs.

In an effort to determine what is probably not only a safe dose but the best for nursing puppies, an experiment was carried out on 12 small cocker spaniel puppies. These were of choice breeding and there was considerable variation in size in the two litters. One litter contained four puppies, the other eight. At the age of four weeks, their weights varied from a runt weighing 17 ounces up to one weighing 48 ounces. Most of them weighed between 40 and 48 ounces.

Each puppy from the runt up was given 0.1cc for each 10.7 ounces—1½ times the recommended dosage. Physic was withheld for three hours following the tetrachlorethylene so that, if there were any ill effects from the drug itself, they would be more easily recognized. Not one puppy was in any way harmed; none showed any dizziness. All of the 12 puppies grew to maturity.

This record is not presented in the nature of a recommendation. The writer is fully aware that caution is needed in the interpretation of these findings. However, on the basis of these findings, the author uses in his own kennels, for young puppies after 18 hours starvation, a dosage of 0.1cc for each 12 ounces of body weight for all puppies needing the treatment, and he feels that this is safe. To date over 400 puppies ranging in age from two weeks to four weeks have been treated with this dosage, followed with a dose of milk of magnesia in an hour. In no instance has a single puppy appeared to have been harmed, and certainly many of their lives have been saved.

* * * *

Rabies in Georgia

We have had several outbreaks of rabies in the city of Augusta at intervals, and also in the surrounding territory. Our local Health Director, Thomas Phinizy, M.D., recently made a statement in the local papers that "the one shot inoculation, Sub. Q., for rabies is worthless." And yet the local board of health in conjunction with the local humane society holds "charity" rabies inoculations at various points throughout the city, usually two or three in each ward, charging, this year, 35 cents each. The city meat and milk inspector gives the inoculations. Last year he vaccinated about 2,500 dogs, while in my private practice I vaccinate about 550 dogs per year at $1.00 each.

The above is, briefly, the set-up here. I have read several times of the results of anti-rabies in the aiding of the control of rabies in various cities, such as Birmingham, Kansas City, Detroit, Tulsa, and others, and also the Japanese results. I have never heard of a case where vaccination failed to control an outbreak of rabies. All its alleged failures seem to occur under laboratory conditions. The Health Director's statements have had a demoralizing effect, and I have been asked several times about the value of the anti-rabies vaccination.

To the best of my knowledge, only two of the dogs that have come down with rabies in the past four years had been vaccinated, one 11 months and the other nine months previous to succumbing. All other cases have been in dogs that had not been vaccinated. I regard this a good showing.

D. M. Howard.

Augusta, Ga.

Hexamitiasis in Turkey Poults

Hexamitiasis (infectious catarrhal enteritis) is a disease of young turkeys caused by a microscopic protozoan, Hexamita. This disease was first observed in California and was recognized in Illinois last year.

Symptoms.—Turkey poults from less than two weeks to a few months of age may be affected. The birds become sluggish and droopy, fail to eat, and die within a day or two after symptoms first appear. A watery diarrhea is usually present. Sometimes no symptoms are noticed before death.

Lesions.—Upon autopsy, the turkeys appear emaciated, and their crops are empty. The gall bladder may be enlarged. The contents of the intestine are thin and watery, and may contain gas bubbles. The ceca are usually enlarged, and the walls of the whole intestine may be rather flabby. When the intestine is opened, inflamed areas may be seen, particularly in the duodenum.

Diagnosis.—The Hexamita can be identified if scrapings from the intestinal wall are mixed with a little physiological salt solution and placed under the microscope. They are very small elliptical bodies which move actively with a somewhat irregular motion. Under high power, traces of the rapidly beating flagella at the anterior end can sometimes be seen. Hexamita should be distinguished from another protozoan, Trichomonas, which is often present in the ceca or blind pouches of turkeys and which apparently does not cause disease. Trichomonas is larger, has an axostyle or "tail" protruding from the rear end, and an undulating membrane along one side of the body which can be seen under the high power of the microscope. While the clinical and autopsy observations may suggest the presence of hexamitiasis, positive diagnosis depends upon finding and identifying the protozoa in the intestinal tract.

Prevention and Control.—No effective treatment for this disease is known. Control depends upon preventive measures. Healthy adult turkeys may be carriers of hexamitiasis. The sale of all breeding birds at least two weeks before the poults are hatched will eliminate them as a source of infection. If this is not practicable, the adult birds should be separated from the poults and separate attendants provided. Poults should be raised under the most sanitary conditions possible. Brooders should be cleaned frequently and thoroughly, and flies should be screened out, since it is possible that flies may carry the protozoa. The food and water containers should be so placed that it is not necessary to enter the pens to clean and fill them. Birds on range should be moved often. An adequate diet and plenty of fresh, clean drinking water should be supplied. If the disease is present, sick or emaciated poults should be removed.—*Div., Animal Pathology and Hygiene, Univ. of Ill.*

* * * *

There are six breeds of turkeys in the United States, all developed from the American wild turkey—bronze, bourbon, red Holland, white Holland, black and Narraganset. Twenty-five million birds are marketed in the United States annually, for which the consumer pays $70,000,000. The turkey is the only animal that civilized man has domesticated.

* * * *

Off-Flavored Turkeys

Experiments at Michigan State College have shown that administering feeding grade cod-liver oil for as short an interval as 10 days before slaughtering at a 4% level is sufficient to produce in the cooked birds objectionable flavor. A cod-liver oil concentrate at 2% of the ration was without bad effects. The trouble was not caused entirely by post-mortem changes in the intestine because it occurred in birds drawn immediately after slaughtering. It was noted that the skin of the cooked turkeys was the most unpalatable portion of the affected birds. Thus the drippings were bad tasting and produced unpalatable gravy which when eaten with good flavored meat made the combination bad tasting. The tests point to the advisability of eliminating the animal feeding grade of cod-liver oil from turkey rations several months prior to slaughtering or replacing it with a vitamin A and D concentrate.—*Rpt. of the Div. of Vet. Sci., Mich. State Coll.*

Leucemia in the Dog

Brumley defines leucemia as a disease characterized by an increase in the white blood corpuscles, together with changes in the spleen, lymph glands, or bone marrow. It has been defined by Feldman and others as malignant neoplasm, a hyperplasia of the blood forming tissues, of which the immature lymphocyte or its forerunner is the cell type.

According to some investigators leucemia occurs most frequently in dogs. Records at the veterinary clinic of Kansas State College show practically equal incidence in dogs and cattle.

The etiology of leucemia has never been determined, but it is thought to be toxic in origin. Some, however, are of the opinion that it is a virus disease as is thought to be the case in fowl leucosis.

March 24, 1939, a female, Boston terrier seven years old and showing marked enlargement of the superficial lymph glands was presented at the clinic for treatment. According to the owner, this condition had been progressing for two months, starting with the glands of the head. The enlargement of the glands of the throat gave the animal a grotesque appearance (see illustration).

The chief symptoms, other than enlargement of the superficial lymph glands, were increased respirations and extension of the head and neck to overcome pressure on the trachea due to the enlargement of the submaxillary and retropharyngeal lymph glands.

A tentative diagnosis of leucemia was made and the owner advised that the animal should be destroyed. No therapy was attempted.

With the owner's consent the dog was held under observation for eight days, during which time a series of blood counts was made. The temperature and pulse were normal, the respirations were slightly increased during the observation period.

The results of the blood counts were as follows:

	Normal	1st day	2nd day	3rd day	4th day	5th day	6th day
Total R. B. C.	7,340,000	4,500,000	5,200,000	4,250,000	4,250,000	4,300,000	6,000,000
Total W. B. C.	13,000	14,200	15,000	12,800	12,400	11,800	12,500
Hemoglobin	14.1	11	12.5	12	13.5	14	13
Eosinophiles	7.1%						
Stabs		7%		9%	7%	6%	6%
Juveniles		1%					
Myelocytes							
Basophiles							
Segmenters	68.5%	69%		70%	73%	72%	63%
Lymphocytes	20.69%						
Large		4%		3%	2%	6%	5%
Atypical		15%		16%	7%	6%	5%
Small		6%		2%	10%	10%	21%
Monocytes	1.53%						

At the end of eight days the dog was destroyed by the use of concentrated solution of magnesium sulphate injected into the heart. On autopsy, the following lymph glands were found to be greatly enlarged: right and left submaxillary; right retropharyngeal; right and left prescapular; peripheral gland on back; mammary gland; right and left popliteal. The right submaxillary weighed 152gm; the total weight of all the enlarged glands was 402gm. None of the visceral glands were enlarged and the kidneys, liver, and spleen were normal. The lungs showed considerable anthracosis.

In this case there was not a sufficient rise in white blood corpuscles to make a positive diagnosis, but the immature lymphocyte represented the principal cell type. There was also considerable degeneration among the white blood corpuscles, and many atypical lymphocytes with irregular cytoplasms and nuclei. With these findings considered, the case was diagnosed as leucemia.

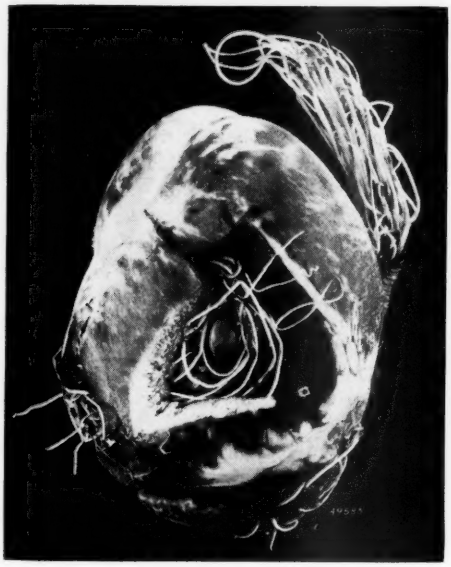
The failure to find the spleen, liver, and kidneys enlarged and swollen in this case does not coincide with the findings in most cases; also, failure to find involvement of the visceral glands was unusual.

WAYNE D. COLLINS.

Windsor, N. C.

Dirofilaria Immitis in a Dog

A crossbred, aged male hound, used for bear hunting in south Georgia, was presented at the Decatur Veterinary Hospital,



Adult Dirofilaria *in situ*

Decatur, Georgia, late one night last spring with this history: A month previously, he had been hunting and had tired rapidly after a short time of running. The dog had become lazy, was in a weakened condition, and while he seemed to have a normal appetite, was rapidly losing flesh.

The symptoms shown were emaciation, abdominal edema, severe anemia, a harsh chronic cough, and a reddening of the skin, which was covered with nodules.

A microscopic examination revealed numerous filaria larvæ in the blood stream. The infestation was so great that treatment was not justified and the animal was destroyed.

On autopsy, the dog showed the following pathological changes: An enormous amount of adult filaria in the heart (see illustration). The posteria vena cava was entirely occluded, and the right auricle, ventricle, and pulmonary arteries contained varying numbers of adult worms. As is usually the case in this condition, the left ventrical, auricle and aorta were entirely free of the adult heart worms. The sluggishness of the blood was indicated by the anemic condition of the internal organs and edema of the subcutaneous tissues of the abdomen.

W. F. STOUDENMIRE.

DeLand, Fla.

Rupture of the Tendo Achillis in a Dog

Rupture of the tendo Achillis in the dog, due to mechanical injury, is a condition that is not uncommon, especially in farm dogs. Often the condition is pronounced incurable and euthanasia advised, or an unfavorable prognosis is given. The following case, which resulted in complete recovery, is reported to describe a treatment which can be used by practitioners without elaborate equipment.

On June 24, 1938, a two-year-old pointer bitch was presented for treatment at the office of Dr. J. F. Thomas, Oswego, Kansas. The dog's leg had been cut by a binder sickle. Examination revealed that the tendons of the gastrocnemius and superficial digital flexor muscles (the tendo Achillis) were completely severed. The saphenous artery and the tibial nerve, which lie anterior to the tendon close to the tibia and furnish the chief blood and

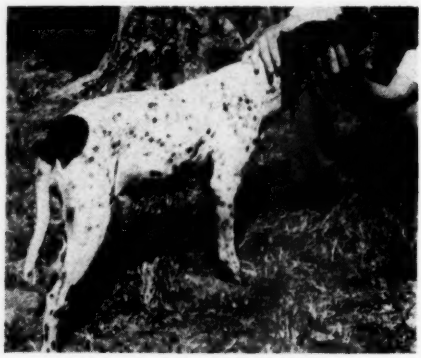
nerve supply to the foot, were apparently uninjured. An unfavorable prognosis was given. In spite of the prognosis the owner insisted that "we try to do something," and the following operation was therefore performed.

The dog was given an anesthetic dose of nembutal intravenously. The operative area was shaved and thoroughly cleansed with ether and painted with tincture of metaphen. The ends of the tendons were dissected free from the surrounding tissue, without enlarging the opening through the skin. With the hock completely extended, the free ends were approximated and held in position by two interrupted sutures. Kangaroo tendon was used for suture material (probably 20-day chromic cat gut would have served as well). The ends of the tendons were carefully approximated, and care was taken to include both tendons in each suture. With the ends in contact, two longer sutures were placed in much the same manner. These longer sutures, however, were passed under the first sutures and at the same time fixed in the tendon at the point of apposition. This was done to prevent the stitch from bowing the tendon. Care was taken not to make these longer sutures too tight.

The area was again cleaned thoroughly with ether and then painted with tincture of metaphen. A piece of baby catheter, sterilized with the instruments, was used for a drainage tube. It was fixed in place by including it in one of the skin sutures. Interrupted sutures of ten-day chromic catgut were used in the skin, and the lower limit of the opening was left open for drainage.

Cotton strips were packed between the toes, and the foot was covered with cotton and wrapped up to the hock. Using a straight 2-inch strip of box-board for a splint, the leg was immobilized with the hock fully extended. This was accomplished by first binding the foot as far up as the hock to the splint. Leaving a window over the operative area, the bandaging was carried up to the level of the stifle. This kept the dog from putting any strain on the tendon. After a few days it learned to walk very well on the splint.

Daily treatment consisted in keeping the area clean. On the 10th day the leg was unbandaged, examined for necrosis and rebandaged. The drainage tube was removed on the 12th day. On the 21st day the splint was removed and the dog walked normally. There was a slight enlargement where the tendon had been injured. Probably the tendon was healed at this time, but the leg was again immobilized. This last splint was left on for five days more and the owner was advised not to allow the dog to exercise violently for two weeks. Six months later the dog was apparently normal, although palpation revealed a slight enlargement in the tendon (see illustration).



The patient six months after the operation for rupture of the tendo Achillis.

In suturing tendons it is well to remember that due to poor blood supply tendons heal slowly; that every possible aseptic precaution must be taken in order to minimize the chances for infection; and that during the time the tendon is healing, the part should be absolutely immobilized. If the veterinarian will follow these simple rules he should be able to attain some of the results that are routinely attained by human surgeons.

GUY A. RAILSBACK.

Van Nuys, Calif.

Mechanical Intestinal Obstruction in a Dog

A wire-haired fox terrier, one year of age, having completed her first puerperium uneventfully three weeks previously, was presented for treatment January 6, 1939, with a grave abdominal syndrome.

The dog was reported to have subsisted on an exclusive diet of bread and milk, which was obviously supplemented, as developed later, by access to garbage containers. Depression had developed to such an extent that she was almost comatose. The temperature was 102.0°F., mucous membranes severely injected, pronounced flatulence present, abdomen very rigid, the cardiac and respiratory phases intermittently irregular, and the pupilary reflex negative. Because of the abdominal flatulence, palpation was negative; but experience with similar cases suggested intestinal obstruction. Toxemia was definitely established.

The animal was hospitalized at 8:15 a. m. Enemata promptly administered were productive of much gas, foul liquid feces, and masses of dried grass and other detritus. The following medication was administered and the animal permitted to rest:

℞ Mag. Sulph.
Digitalis Comp. ..... *aa* 50
M. et ft. solutio
Sig. Give one teaspoonful every hour until purging occurs.

This medication was productive of profuse catharsis by 4:00 p. m., at which time the patient began to void masses of dried grasses and countless numbers of large scales that in size and shape resembled the segments of a shrimp, also large pieces of tissue which appeared nodular, like alligator skin. Additional enemata were administered, producing many more such scales. It was, therefore, concluded that these scales and tissue were the offending bodies directly responsible for the mechanical obstruction.

Specimens of these scales were submitted to the Zoölogical Division of the Bureau of Animal Industry, U. S. Department of Agriculture, for identification. They reported that the specimen appeared to be scales and skin from the toe of a large bird, either a large chicken or a turkey.

On the following day the patient freely took milk and water, and the symptom complex described had disappeared completely. The dog was discharged at 9:00 p. m., with instructions to the owner to feed her twice daily, continuing the liquid diet for three days and restoring a diet of solid food gradually over a subsequent three-day period.

The liquid diet prescribed consisted of milk, broths, soups or gruels, slightly thickened with a cooked cereal such as oatmeal, farina, cream of wheat, etc., supplemented with vegetables such as grated carrots, tomato juice or stewed tomatoes. The diet of solid food was to consist basically of fresh beef, liver or kidney with fat removed (cooked or raw and cut into one-inch cubes), supplemented with the above vegetables, and milk daily. This diet furnishes proper bulk, necessary vitamins and minerals and the required dietary constituents.

H. D. Pritchett.

Doylestown, Pa.

This three-toothed wether has two full-size supernumerary horns. In addition to the three horns shown, the animal has another on the left side of the head that is a duplicate of that shown on the right side.— ***W. M. Nielsen, Cessnock, N. S. W., Australia.***

Recurrent Abscesses in a Dog

January 1, 1939, a seven-month-old, black, cocker spaniel bitch was presented at the veterinary clinic of Kansas State College with an abscess about the size of a walnut above the left eye.

The skin was shaved and incised, liberating a thick, creamy pus which on microscopical examination, revealed a quantity of staphylococci. The incision was left open and flushed daily with chlorozone solution for three days. The wound healed nicely and the animal was discharged.

January 27, the bitch was returned to the clinic to be spayed, and with a history of having abdominal pains. A fluoroscopic examination revealed nothing, but a microscopic examination of the urine revealed a quantity of staphylococci resembling those found in the abscess on the head three weeks previously.

After the removal of the ovaries, the bladder was palpated and a urinary calculus was detected. The abdominal incision was extended posteriorly until the bladder was exposed. A small incision was made in the bladder and the calculus removed. It measured about 1¼ inches in diameter. The bladder incision was closed with Lembert, catgut sutures and the laparotomy incision with interrupted, braided silk sutures. Ten cc of distemper serum was given, and the animal was confined in the hospital for five days. It made an uneventful recovery and was discharged.

February 16, the dog was returned to the clinic again with a history of anorexia and painful defecation. It had a temperature of 104°F., and showed pain when the abdomen was palpated. A urinalysis was negative. An exploratory laparotomy was performed and an abscess was discovered in the wall of the pelvis. It was deemed inadvisable to open the abscess through the laparotomy incision, so it was sutured.

An area was prepared in the peroneal region about one-half inch lateral to the anus. A one-inch incision was made through the skin and fascia, and by blunt dissection was extended to the wall of the abscess, which was about one and one-half inches anterior to the incision. The abscess was punctured with a needle to determine its contents. It was then incised and 20cc of pus was evacuated. The rest was flushed out with potassium permanganate solution. A smear of the pus showed a quantity of staphylococci resembling those found in the two previous operations.

Sulfanilamide was given in 15gr doses for three days. The temperature returned to normal and the appetite improved. The wound was flushed daily with potassium permanganate and a low enema given. On the seventh day the temperature rose to 104.5°F., and the administration of sulfanilamide in the same dosage was resumed for three more days. At this time the dog appeared normal, the wound was almost healed, and the animal was discharged from the hospital.

This dog was again returned ten days later for a checkup and appeared normal in all respects. A microscopical examination of the urine was negative.

It was interesting to note that all the smears were apparently of the same strain of bacteria. It is thought that a cystitis caused the urinary calculus, and that the abscess above the eye and, later, that in the pelvic cavity were due to metastasis.

P. H. CURRY.

Kansas City, Kans.

* * * *

Dairymen are in advance of other branches of the live stock industry in employing artificial insemination. The first breeding unit organized in this country for this purpose was in Minnesota in 1937. In May, 1938, a breeding society comprising 102 dairymen was organized in New Jersey. It has grown rapidly and now more than 4,500 cows are bred artificially. New York, Wisconsin, Michigan, Missouri, Nebraska, California, Mississippi and Maine also have operating artificial insemination units. In addition, much unorganized artificial insemination is being carried out by veterinary practitioners, principally in cattle but including all farm animals and dogs.

Legal Rights of Veterinarians in Public Office

By LEO T. PARKER, Cincinnati, Ohio

FREQUENTLY veterinarians appointed to the office of meat inspector or milk inspector or other public office are uncertain about the extent of their positions. In other instances they do not know their legal rights with respect to resisting removal from office or compelling payment of their salary. It is therefore important for them to be cognizant of their legal rights under various circumstances.

Entering Premises by Force

Sometimes state or county veterinarians meet with resistance from owners of stock when endeavoring to fulfil their public duties. State laws have been formulated for the purpose of clothing such officers with sufficient authority to use necessary force to carry out their official duties.

For example, in the case of Ded v. Smith, 184 Atl. 595, it was shown that a law, common in many states, provides that the Commissioner of Agriculture, or his duly authorized agent, may enter any premises in which he has reason to believe that there exists any infectious disease, and make investigation regarding this. A state veterinarian, appointed by the Commissioner, in the course of his duties requested that a farm owner permit him to test cattle for bovine tuberculosis. This request was refused, and the veterinarian forced entrance to a barn for the purpose of making this test. The cattle owner filed suit on the grounds that it was unlawful for the state veterinarian to break into the barn, particularly in view of the fact that the milk was not being sold to the public. The higher court upheld the action of the veterinarian, stating:

"The state veterinarian has authority to test for tuberculosis all cattle within a duly established quarantine area. For that purpose he is authorized to enter 'any premises' where cattle are kept, and since cattle are usually kept in barns, it follows that he is clothed with authority to enter such buildings in the performance of this duty."

Removal from Office

Generally speaking, procedure to remove a public official from office must be strictly in accordance with the law, and usually the removal order must be issued by a superior who is authorized to do so by a valid state law. Although a notice be given to an official that another person has been appointed as his successor, this is not a legal notice of removal. The notification must distinctly specify removal or discharge under a valid law; otherwise the official may demand reinstatement.

Although in many instances state laws provide that public officials may not legally be removed from office without a legal notification and a hearing, in some states there is no state law requiring such notification, and in these an official may be removed from office without notification or hearing.

For instance, in Coffey v. Way, 14 P (2d) 143, it was shown that suit was filed against a city to compel the mayor and city council to allow an official to perform his duties with regular pay. During the trial evidence was introduced showing that at a special meeting of the city council an ordinance was passed removing the official from office, the removal being made without notice to him and without hearing. Since no state law required that city employes and officials be notified, the higher court upheld the removal, saying:

"The officer takes the office with the knowledge that he may be removed therefrom without notice or hearing, whenever, in the judgment of the council, his removal will promote the public service, and, if he is removed in strict accordance with the law, it is no objection to the validity of the removal to say that it was done without notice or investigation, where the law does not require it."

If, on the other hand, a veterinarian holds public office under a state law, and

anyone endeavors to oust him illegally, he may file suit and ask the court to grant an injunction against such unlawful interference. For example, in Sutton v. Adams, it was shown that Sutton was duly appointed state veterinarian under a state law which defined his duties and fixed his salary. The Commissioner of Agriculture sought to discharge him from this office, and designated another man as Chief Veterinary Adviser, sending the latter into Sutton's office to take charge of the work. Sutton filed suit and asked the court to grant an injunction against this interference with the performance of his duties as specified by state laws. Although the lower court held Sutton not entitled to relief, the higher court reversed the verdict, saying:

"Sutton alleges plainly that he is the state veterinarian and that by an act of the General Assembly he was constituted such officer for a term of four years. This court will take judicial cognizance of the enactments of the Legislature. Although proceedings by injunction cannot be used as a means of determining disputed title to office, they may be properly used to protect the possession of officers *de facto* against the interference of claimants whose title is disputed, until the latter shall establish their title by the judicial proceeding provided by law."

Delay in Filing Suit

Various courts have held that when a civil service employe has been unlawfully discharged from public duty, he is bound to complain within a reasonable time or he will not be entitled to a favorable verdict. Therefore, when a veterinarian is unlawfully removed from office, whether from disregard of the law by his superior or by mistake, considerations of public policy make it of first importance that he take *promptly* the action requisite to effectively assert his rights.

For example, in Wiltz v. Sewerage & Water Board, 145 So. 34, it was disclosed that a municipal official was discharged from his position by letter from the Secretary of the Board. The official delayed eight months in filing suit for reinstatement. In view of this delay the court held him not entitled to a favorable verdict, saying:

"However unjust and unwarranted a discharge of a civil service employe may be, and however great may be his right to his position, it is obvious that continued failure to assert his right may and should be considered as a waiver of such claim to the position as he may originally have had."

Recovering Back Salary

Generally speaking, a veterinarian is not entitled to recover public salary in arrears unless he proves that he rendered services to the municipality or state and thereby earned the salary. In other words, a state or municipal veterinarian cannot, under ordinary circumstances, recover for services he has not performed. On the other hand, if a veterinarian has been *unlawfully* prevented by state or municipal officials from earning a salary, he may file suit against the state or city and recover damages for breach of the employment contract.

These points of the law were discussed in the case of Thomas v. City of Euclid, 182 N. E. 605. The municipal council passed an ordinance appointing a man named Thomas to public office for a period of two years. Subsequently the council without cause discharged Thomas, and he filed suit against the city to recover his salary from the date of the discharge. He admitted that he had not performed the services, but alleged that he had been prevented from so doing by the action of the council in illegally discharging him from duty. He contended that since the council had appointed him for a two-year term this appointment constituted a valid and enforceable contract which prevented the council from discharging him from service. The higher court said:

"He (Thomas) cannot maintain an action on a contract for services which he had not rendered. If this employment was a contract, then the plaintiff (Thomas) could not recover under his present form of action because he seeks to recover not damages for a breach of the contract, but the salary earned, to wit, $500 a month. One cannot recover for services rendered under a contract unless one performs the services and earns the money. His remedy would be, if it was on a contract, to sue for breach of the contract, and in that event the recovery might be the same as his salary would be, but he surely cannot maintain an action for services rendered when he did not render the services."

Sabotage of Young Veterinarians?

Of late, much has been written of the possibilities that the veterinary profession offers as a career for young men.

I was informed recently that of 19 candidates taking the examination for license to practice in a northeastern state, only seven were qualified. Most of them were recent graduates.

In view of this, it appears to me that something is very "screwy" somewhere. Certainly all who are familiar with the system of veterinary education as it exists today will agree that today's graduates are far better prepared to practice than were we who graduated 10, 20 and 30 years ago.

Surely the professors with four years of association with the students are capable of appraising their ability to practice better than examining boards who are not personally acquainted with the candidates and have only a written examination paper to guide them.

Of course, the general public is entitled to protection from persons not properly qualified to practice our art. That is the purpose of veterinary practice laws. It seems, however, that some fear the competition of recent graduates and attempt to minimize the risk by refusing them the right to compete. They would do better to seek out and prosecute the unlicensed "quacks," get out their books and journals, attend meetings and try to contribute something constructive to the profession rather than "flunk" young men whose preparation is far superior to what was required of them.

While we are emulating the medical profession in many respects we might try further to get the states to honor each others' licenses, or better yet set up a national veterinary examining board whose certification would be recognized by all state veterinary examining boards. The latter would certainly stimulate the student to do a better job as such a certification would be looked upon with considerable pride by its possessor.

I am writing this because I feel the veterinary profession is deserving of every bit as much prestige as any other. The present-day courses in veterinary medicine are equally as thorough as those presented in human medicine (and I feel I can judge, as I have studied human medicine). I deplore any attempt to close the door to practice against our present graduates. The only qualification the young men lack is experience.—*R. S. B.*

Painless Collections

A veterinarian troubled with a lot of money tied up in slow pay accounts, decided to do something about it. He soon discovered that the one way to get his money and pay his own was to eternally prod slow-pay clients until they came across with a check.

Of course, he does it in a friendly way and in such a manner that none can take offense. His system starts when payment is delayed and the records show the account becoming overdue. Every statement covering such slow pay clients which is made out at the end of the month is made out in triplicate.

Ten days after the original statement is mailed, if nothing has been paid, he mails out the duplicate with a sticker of some kind attached. And ten days after that, if nothing has been heard from the delinquent debtor out goes the triplicate with still another sticker attached. And just before the end of the month a third sticker is mailed. These various stickers read:

JUST A REMINDER

That you've probably overlooked payment of this account . . . and we'd appreciate your remittance by return mail. THANKS!

YOUR SECOND REMINDER

Here is a duplicate of the last statement sent you! Ten days have elapsed and still no check. You forgot it, didn't you? Just say it now with a check by return mail . . . lest you forget again!

YOUR THIRD REMINDER

We haven't forgotten you, even if you may have forgotten us. Here is a triplicate of your unpaid statement. How about sending us that check today?

These stickers are friendly, persuasive little reminders that tell delinquent debtors "we want our money . . . no fooling," but it is said in such a cordial manner that they do not offend even the most "touchy."

The stickers are generally printed with a heavy border, blue one time, green the next, and all red for the last one. Thus they stand out and the short printed message will be seen and read.

For those who have still neglected payment after the series of sticker reminders are mailed, the account is again made out in triplicate and the following typed statements appear on the bills, which are now mailed out weekly to reach the debtor every Saturday morning:

OVERLOOKED?
How about that check TODAY?

NEED A SHAVE?
If you don't pay this bill soon, whiskers will start growing on it.

FURTHER DELAY FATAL
We must really have a check by return mail or an explanation of when you can pay. This is the sixth and last reminder. Do it today . . . we cannot permit further delay!

If nothing happens (but something nearly always does along this six-lane route), then those accounts still unheard from, and on which nothing has been paid, get a collection letter done in the form of a telegram on yellow paper:

COLLECTO-GRAM
PLEASE SEND CHECK AT ONCE. NO ATTENTION HAS BEEN PAID TO SIX STATEMENTS OF ACCOUNT. WE MUST HAVE A CHECK OR AN EXPLANATION FOR THE DELAY BY THE TENTH OTHERWISE WE WILL HAVE TO PLACE THIS IN THE HANDS OF OUR ATTORNEY FOR COLLECTION. SAVE COURT COSTS AND LEGAL EXPENSES . . . PAY NOW!

With this method of collecting accounts, this veterinarian experiences but little difficulty in keeping his accounts liquid and paid up to date. The stickers and typed reminders are forceful prodders and yet the debtor can take no offense. Since using this method of collecting overdue accounts, he has reduced his credit losses more than 37%. In two months after he starts the ball rolling, only a comparatively few slow ones or "dead beats" remain to be accounted for.

These stickers save much letter writing and telephoning, because they help to keep the debtor constantly reminded that he "must pay" sooner or later, and the psychology of having a reminder "pop up" every so often wears down his paying resistance.

Another veterinarian uses a slightly different method of attack. He starts off his series with a duplicate statement of account, on which is printed at the top "Advisory Memo" and he pins a slip to it which reads:

JUST PIN YOUR CHECK TO THIS
And Drop It Into the Nearest Mail Box TODAY.
This pin will keep you from forgetting.
Use it wisely but use it promptly.

If nothing happens, he uses the following stickers, one after the other:

YOU FORGOT IT
Didn't you? Then, why not send us that check TODAY?

STILL WAITING
For Your Remittance. Won't you Please Mail It TODAY?

WE'RE PATIENT
Because we know how easy it is to forget these little things, but we don't want you to forget us this time again.
A Word To the Wise is Enuf!

PAY NOW AND FEEL BETTER
This bill should be paid at once to protect your good credit standing. We must submit monthly reports to the credit bureau. DO IT NOW.
Save Further Embarrassment.

These reminders have the desired effect in many cases. In the past he has also used the credit motif to good advantage, emphasizing the psychological factor of keeping credit good, such as:

PROTECT YOUR CREDIT
Credit is like a looking glass. Once sullied by a breath it may be wiped clear, but once it is cracked, it can never again be repaired. No one can protect your credit but you. No one else can destroy it. Your credit is what you make it and one of your greatest assets. It can also be a liability. SEND IN THAT CHECK TODAY!

KEEP YOUR CREDIT GOOD
Prompt pay is the soul of good business. Nothing so cements the bonds and holds together all parts of the business fabric, as credit. Good intentions do not build credit. Only by religiously living up to every agreement, discharging every obligation when due, is credit kept good. Mail In That Check TODAY.

—*Fred E. Kunkel.*

* * * *

Mosquitoes will enter and leave a cistern or other receptacle containing water through perpendicular pipes that have a diameter of one inch or less, even if such pipe is as much as 14 feet in length. They will not enter through a horizontal pipe when it is 12 feet or more in length, although if hatched in a cistern they will pass out of a horizontal pipe if there is no other exit.

Abstracts

Gestation Period in the Marten

Eleven young martens[79] have been born at the Quebec Zoo since 1933, of which 10 are still alive. Matings occurred about August 20th and birth in early April, establishing the period of gestation at 220 to 230 days. At birth martens weigh 28gm, adult female about 750gm, and adult male 1100gm. At birth the eyes and ears of the young are closed; the former open at 26 and the latter at 39 days of age. The young are weaned at six to seven weeks of age and reach adult weight at three months.

Construction of Sanitary Meat Packing Plants

This publication[86], issued by the Division of Animal Industry of the California Department of Agriculture, details the sanitary features required in slaughtering and meat processing plants to meet the requirements of the state meat inspection law.

Causes of Death in Foals

Lang[80] gives his experience with 83 pregnant mares that were well fed and given supplements of iodine and vitamins A and D. Sixty-one of the foals survived. Of the 22 that died, death was due to abortion in four cases, dystocia in five, traumatism in three, retained meconium (and navel ill) in eight, agalactia in the mare in one and weakness at birth in one case. Altogether 21 foals suffered from retained meconium, of which 13 survived. All cases of toxemia and joint ill were preceded by retained meconium. The author's conclusions are: (1) joint ill originates in the alimentary canal, not through navel infection, and follows retention of the meconium; (2) the cause of the retention is unknown, and (3) the earliest possible treatment of the foal with retained meconium is imperative.

[79] Brassard, J. A. and Richard Bernard, 1939. Observations on Breeding and Development of Marten. *The Canadian Field-Naturalist* 53:2.

[86] Boyd, A. G., and Harry Shepherd, 1939. Some Sanitary Aspects of Meat Plant Construction. Div. of An. Ind., Calif. Dept. of Agr., No. 168.

[80] Lang, W. W., 1939. Foal Mortality. *The Veterinary Record* (London), 51:5.

Anesthesia in Sheep

Phillipson and Barnett[81] state that inhalation anesthesia is wholly unsatisfactory in sheep; ether is ineffective, chloroform is extremely hazardous, there being no safety margin between anesthesia and respiratory failure and A. C. E. differs but little from ether.

Nembutal is measurably satisfactory only in lambs less than two months of age. In adult sheep there was great variation in the tolerance for nembutal, the cost high and the anesthesia of very short duration.

Chloral hydrate is not considered suitable. It is very irritant and does not prevent reflex movement of the patient.

Chloralose is favored over the other anesthetics named. A disadvantage is its low solubility and the long time required to prepare the injection; also the large amount of the solution that must be injected.

Thrombosis in a Horse

Following a period of about four months of enforced idleness owing to severe strain of a fetlock joint, a nine-year-old draught horse, when put to work, showed symptoms indicative of thrombosis of the termination of the abdominal aorta.[82]

The appearance of lameness that became progressively worse, arrest of progress and collapse, accompanied by sweating, dyspnea and groaning, seemed at first to suggest paralytic myoglobinuria. However, there was rapid abatement of symptoms, the urine was normal, and on rectal examination the external iliac and hypogastric arteries on both sides were found to be thickened, hard and painful.

Complete rest in a box for 14 days, succeeded by exercise in gradually increasing amount, was supplemented at first by injection of fibrolysin. As, after four weeks, this appeared to have had little beneficial effect, it was replaced by intravenous injections of sklerostomex, diluted three in 40 in physiological salt solution, given eight times with intervals of seven days between injections. Spectacular recovery followed.

[81] Phillipson, A. T. and S. F. Barnett, 1939, in *The Veterinary Record* (London), 28:51.

[82] Wurfschmidt, 1938. *Zschr. Veterinark.* 51:25-31. Abst. in *The Vet. Rec.* by J. W. W.

Guides for Horse Buyers

This bulletin was published in response to an increasing number of requests for information from farmers and inexperienced men who wish to buy horses, either for use on their own farms or for the foundation of purebred breeding establishments. So much uncertainty exists regarding age and soundness in horses that this publication is written and illustrated particularly to give assistance along those lines.

Encroachment upon the field of veterinary medicine is not intended by the author[83], who sincerely hopes that his efforts will help to bring about a better understanding between the veterinarian and the horseman and promote a feeling of appreciation, coöperation and friendship.

Renewed interest has been shown recently in horse breeding. This interest is largely due to increased prices of horses, low prices of farm produce, shortage in horse numbers and economy in use of horses for power. It seems that farmers have realized that an acute shortage of horses exists; therefore, there is also a continued interest in horse breeding.

Good horses and mules long have been recognized as an efficient and economical source of power for the farm. Feed consumed by horses is not only cheap "fuel" but is an important factor in preventing the accumulation of surplus farm produce. Manure is an economical fertilizer and very important in maintaining soil fertility. The brood mare not only will do her share in the harness but will produce colts which add considerably to the farm income. Stallions may be used for work as well as for breeding purposes.

In 1929 there were approximately 605,000 horses in Michigan, and this number had decreased to 378,000 in 1937 with more than 50% of those past 10 years of age. Since the average life of a horse on the farm is 15 years, it is easy to understand that colt production is not keeping pace with mortality. Farmers in Michigan are not raising much more than half the normal colt crop needed for replacements.

[83] Hudson, R. S., 1939. Mich. State Col. Ext. Bul. No. 197.

The bulletin discusses: breeds of draft horses, general appearance, the head and neck, the forequarters, the body, the hindquarters, action of the draft horse, influence of care and feeding upon value, temperament and vices, lameness, common unsoundnesses, fistula of the withers, sweeny, shoe boil, splint, wind-gall, road-gall, windpuff, ringbone, contracted tendons, knuckling, sidebone, quittor, sand-crack, navicular disease, laminitis, scratches, stifled, stringhalt, thoroughpin, bog spavin, bone spavin, capped hock, curb, white horse tumors, melanomas, hernia, buying the brood mare, pedigrees, and shipping the horse.

Each subject is illustrated by one or more halftones or drawings; determining the age of the horse being illustrated by 33 figures showing the incisor teeth. Ten large halftones of typical stallions and mares of purebred Belgian, Percheron, Clydesdale, Shire and Suffolk stock are a particularly valuable feature of the discussion. A brief history and description of these breeds is also given, together with the name and address of the secretary of the breed association for each breed.

* * * *

Fat Rations and Milk Production

The authors[84] found that there was a decrease in milk production of cows fed a ration low in fat, and an increase in milk when soy bean oil was added to the basal ration, or when beet pulp in the basal ration was replaced by corn. When barley replaced soy bean oil and beet pulp, there was a drop in milk production. The addition of soy bean oil in place of an isodynamic amount of beet pulp to the basal ration resulted in a temporary increase in butterfat percentage; this increase was of short duration and the fat percentage soon returned to normal. When beet pulp was replaced by corn, the fat percentage in the milk remained unchanged. These results are in agreement with those of Maynard and associates, who showed that a certain amount of food fat is essential for optimum milk production.

[84] Gibson, Gale, and C. F. Huffman, 1939. The Influence of Different Levels of Fat in the Ration upon Milk and Fat Secretion. *Mich. Agr. Exp. Sta. Quarterly Bul.* 21:4.

Effects of Vitamin A Deficiency in Calves

Research has shown that calves fed on a ration containing less than an adequate quantity of vitamin A suffer blindness, temporary or permanent depending upon the cause and the period over which it acts. Blindness from vitamin A deficiency may be due to (1) constriction of the optic nerve due to bony changes, (2) papillary edema and (3) xerophthalmia.

Moore[85], from an experiment to determine the relationship betwen carotene, blindness due to constriction of the optic nerve and papillary edema and nyctalopia in calves, reached the following conclusions:

1. Calves fed low carotene rations develop nyctalopia, papillary edema and a permanent type of blindness associated with a constriction of the optic nerve.

2. The development of these conditions can be prevented by supplementing the low carotene ration with crystalline carotene dissolved in cottonseed oil. Consequently these conditions appear to be a part of the syndrome of vitamin A deficiency in calves.

3. The development of the constriction of the optic nerve is associated with a stenosis of the optic canal, papillary edema and probably increased intracranial pressure.

4. The development of papillary edema and nyctalopia are separate processes but both are due to vitamin A deficiency.

5. Vitamin A deficiency in calves is usually not associated with the development of keratitis.

6. Vitamin A deficiency in calves is associated with a condition of syncope, most likely produced by increased intracranial pressure.

7. Vitamin A deficiency in calves may be diagnosed by the presence of both papillary edema and nyctalopia.

8. Papillary edema persists for a considerable period after feeding carotene.

9. Under proper conditions of observation bleaching of the tapetum lucidum of the retina is a good guide for the diagnosis of vitamin A deficiency in the bovine species.

10. Plasma carotene determinations of the bovine species also give an indication of the vitamin A reserve where the colorless vitamin A is not being fed and the carotene intake is somewhat limited.

[85] Moore, L. A., 1939. Relationship between Carotene, Blindness due to Constriction of the Optic Nerve, Papillary Edema and Nyctalopia in Calves. *The Jnl. of Nutrition*, 17:5.

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Bilateral Variation in the Bones of Animals

In a study[87] of bilateral variation in the weight and composition of green bones of 20 rats, 20 chicks, 19 hogs and two dairy heifers the following results were obtained:

1. No significant differences in weight of green bone or in percentage of moisture, ash and organic nonfat were found in bones from the right and left sides of the rat.

2. In the chick bones green weight and percentage of moisture were significantly higher on the left side while percentage of ash and organic nonfat were significantly higher on the right side.

3. In the hog bones green weight, percentage of moisture and percentage of ash were significantly higher on the right side.

4. The dairy heifers showed a tendency toward heavier bones on the right side.

5. In animals in which one side showed a tendency to dominate in weight of bone the same side tended to be higher in percentage of moisture and the opposite side to be higher in percentage of ash.

These results may be interpreted as suggesting (1) that certain species of lower animals may tend toward a dominance of one side over the other with respect to bone development, and (2) that bones from one side are not necessarily identical in composition or other properties with those from the other side, although in general the differences found in these experiments were quite small.

[87] Weakley, Chas. E., Jr., and R. B. Dustman, 1939. Bilateral Variation in the Weight and Composition of the Long Bones of Some Experimental Animals. *Jnl. Agr. Res.* 58:9.

Rabies in Birmingham, Alabama

Birmingham, Ala., has been called the rabies capital of North America. Since 1922, 48 persons have died of the disease in that city, and 42,927 have taken the Pasteur treatment.

The dog census of Birmingham lists 20,609 dogs for which ownership is established. Of recent years 1% of the owned dogs have contracted rabies. This includes only reported cases in which the diagnosis was confirmed. Since negroes own approximately 40% of the dogs and report but few cases the writers[88] infer (allowing for some lapses in reporting cases on the part of the white population) that the incidence of rabies among owned dogs in Birmingham is easily 2% annually. They have no means of determining the incidence among the large number of stray dogs in the city.

During 1938, 5,107 dogs belonging to white persons were given anti-rabies vaccine. The incidence of the disease in this group was 0.5% and among the 7,905 nonvaccinated dogs belonging to white persons 1.35%.

This report is far less favorable to vaccination than any heretofore published from the field. No details are given upon which to account for this difference.

The authors find little relation between the mortality from rabies [in persons] and administration of the Pasteur treatment. Among the highly exposed [actually bitten] untreated (negro) population the fatalities are no more numerous than among the highly exposed, treated (white) population. Such rare fatalities as have occurred are equally distributed among the treated and the untreated. With rare exceptions the board of health advises Pasteur treatment only for actual bites or scratches made by the teeth or claws of known rabid animals or of dogs that have escaped so that a diagnosis cannot be made. Treatment is not advised following:

(1) Contamination of old cuts, sores, abrasions, scratches or hangnails with saliva of known rabid animals, (2) "pinches" in which the skin is definitely broken but the clothing neither torn nor penetrated; (3) handling, eating after, sleeping with, kissing or other intimate exposure to rabid animals; (4) drinking milk of rabid cows, eating meat of rabid animals; (5) bites of any animal living 14 days from the time of biting; (6) bites from fleas from rabid animals; (7) any exposure to a case of human rabies other than an actual bite, or direct contamination of fresh, open wounds, or (8) any exposure to a nonrabid animal just bitten by a rabid animal except when infected saliva is directly transmitted to a fresh, open wound.

While, theoretically, rabies can be contracted from these and many other types of exposure, it practically never occurs. Vaccine paralysis, or other serious complications resulting from administration of vaccine, are probably more frequent than the development of rabies from any exposure other than an actual bite; and, in advising treatment one should carefully weigh the possibilities of death or permanent injury from vaccine against the possibilities of death from rabies.

Four known paralytic accidents have occurred in Alabama with the administration of 33,147 Semple treatments, an incidence of one in 8,287. Of 45 deaths in Alabama on which there is definite history regarding the type of exposure, all the victims are known to have been bitten. These two facts contain the whole wisdom of withholding treatments from those not actually exposed.

From their large experience the authors conclude:

1. Rabies is primarily a veterinary problem. Regardless of its prevalence among dogs, it will probably never cause sufficient morbidity or mortality among human beings in this region to allow its classification as a public health problem of importance.

2. If rabies were as easily contracted by man as is commonly supposed, it would in Alabama become one of the leading causes of death. Instead it continues to be a very rare disease.

3. In this region there appears to be little relation between mortality from rabies and the administration of antirabies vaccine [Pasteur treatment].

4. Aside from an actual bite or scratch, circumstances of exposure rarely warrant vaccine [Pasteur] treatment.

5. When considering the advisability of treatment for exposures other than an actual bite, the possibilities of vaccine paralysis or other serious complications should be considered.

6. The problem of rabies, as it is known in Birmingham, appears to be one of home owned dogs (pets) and not of unidentified strays.

[88] Denison, George A., and J. F. Dowling, 1939. *Jnl. Am. Med. Assn.*, 113:5.

Nymphomania in the Mare

Nymphomania is described as a neuro-hormonal disease of female animals, being at its worst in the mare.[89] Neurasthenia is present as a constitutional abnormality, with overproduction of sexual hormone resulting from chemical action in the ripening and ripened ovarian follicle. Professor Hetzel divides the disease into three grades, a mild or first grade, an advanced or second grade, and a very advanced, or dangerous, stage when the mare may be dangerous to handle, and may even injure herself, as grade three.

Anatomical and histological details of the equine ovary and its cysts are given, and the types of cysts encountered are classified as:—

1. Serous cysts.
2. Smooth-walled cysts.
   a. Grape-like cysts, papillary epithelial.
3. Follicular oöphoroma.
4. Tubular adenoma.
5. Teratoid cysts.
   a. Dermoid cysts.
   b. Atypical dermoid.

The formation of primary and secondary (Graäfian) follicles is described. Cysts may form after the rupture of the follicle and the discharge of ovum. First there is the leutin follicle—corpus luteum atreticum, containing yellow matter—then the theca-follicle cyst which is yellowish or orange colored, and the theca-leutin cyst which is reddish-yellow, and may rarely contain blood.

The first or mild stage of the disease may be treated by massaging the ovary through the rectum. Massage treatment will have to be carried out for about five or six days, but results in the mare are not so good as in cattle. Massage plus hormone treatment (prolan B) may often give good results.

For stages 2 and 3, ovariotomy is recommended. The mare is fasted for 48 hours. After 24 hours, 500mg magnesium sulphate in 1.5 litres of water is given by stomach tube, and half an hour before the operation 30 to 35gm chloral hydrate in mucilage. The vagina is not washed. The mare is placed in stocks with leg slings, and the hindquarters raised so that the hoofs just touch the ground. An assistant empties the rectum and bladder, and inserts a 25cm-long wad of tow into the rectum. The external genitals and surroundings, buttocks, tail, etc., are washed with warm water and soap, dried with a sterile towel and painted with a 6% alcoholic solution of iodine. The tail is bandaged with a sterile bandage, whilst a sterile towel is placed over the crupper and anus. The vagina is anesthetized by painting with 1% procaine tampons of gauze. With a Hauptner's knife an incision is made in the middle line of the vagina over the cervix, about 2 or 3cm, and the wall and peritoneum are cut. The cut should be big enough to enable the forefinger to be inserted through the wound. With the other fingers, the wound is enlarged and the whole hand inserted into the abdominal cavity.

The ovarian ligament is tied with a thread and anesthetized by means of 1% procaine solution on gauze tampons. The ovary is then grasped and the écraseur chain placed on the ligament and twisted very slowly, taking five or six minutes to remove the ovary. The écraseur should be a long one, with a thick screw. The ovary is then removed by hand. Tampons in the rectum are removed. The mare is placed in a stall with plenty of straw, and is given water and hay about six hours afterwards. She should have some exercise on a lead on the third day, with light work in about 14 days, gradually increasing. Grooming is forbidden, and the mare is only wiped down with a cloth for weeks after the operation.

Professor Hetzel claims to have had more success with ovariectomy than with any other method in the mare, but emphasizes that it is successful in curing the disease only when the chief cause is an overproduction of hormone rather than a neurasthenia.

[89] Hetzel, H., 1938. *Tierarztl. Rdsch.* 44:681-685; 697-702. Abst. in *The Vet. Rec.* by D. J. A.

Vitamin D Deficiency in Swine

That a deficiency of vitamin D often occurs in swine during the winter under farm conditions is suggested from numerous reports received from farmers in Minnesota of so-called fits in pigs. This is supported by the fact that two separate groups of fall pigs raised at the Minnesota Agricultural Experiment Station were later found to be partially or entirely depleted of vitamin D reserves at the time they were placed on experiments which are reported in this paper.[91]

Many experiments have been conducted to determine the improvement in swine rations from additions of calcium, phosphorus, and vitamin D supplements. Unfortunately, it is not possible to interpret the results of the majority of these experiments in terms of the pig's requirement for vitamin D because in some the relationship between these mineral elements and vitamin D was not considered; and in others, the content of these nutrients in the control rations, as well as in the supplements, was not determined. It is of importance in nutrition experiments with swine, as well as in practical pig feeding to know whether the pig is similar to the rat in not needing vitamin D when the calcium and phosphorus content of the ration is properly adjusted or whether it is similar to the chick in needing vitamin D regardless of the level of these mineral elements.

A series of investigations conducted on the vitamin D requirement of the pig show that the pig requires vitamin D and that there is considerable variation among breeds and even among pigs of the same breed in this requirement; that the reduced plasma-calcium values, as a result of lack of this vitamin, have a pronounced effect on growth and feed consumption; and that white pigs are less apt to become rachitic than colored pigs under similar conditions.

At the time the rst experiment was started, Jan. 8, 1934, the Poland China pigs were quite unthrifty but were used because other pigs were not available. Two of the pigs in the group from which the six were taken for the experiment had had several tetanus-like convulsions. The results of the blood-calcium analyses, made one week after the start of the experiment, readily explained their behavior. They were suffering from slight to very great diminutions of blood calcium. The vitamin D stores evidently had been depleted during the early part of the winter. From this it appeared that a low-calcium tetany can be produced in pigs with a ration adequate in calcium but lacking in vitamin D, or, as has since been reported by Hughes, with a ration adequate in vitamin D but low in calcium.

As the experiment progressed, the blood-plasma calcium of the pigs decreased to very low levels. The change in the inorganic phosphorus, however, was relatively slight and highly variable. February 14, the amount of irradiated yeast fed was increased to 0.15%. That this was beneficial was evident from the higher plasma calcium values of lot 3 on February 27 and 28. A similar increase of the unirradiated yeast in the ration of lots 1 and 2 on February 14 was without benefit.

By February 28 all the pigs in lots 1 and 2 had severe cases of rickets, as judged from their low blood calcium, harsh hair coats and an unthrifty appearance. On this date the unirradiated yeast in their ration was replaced by irradiated yeast. This had an immediate effect in raising the blood calcium to a normal value. There was also an improvement in appetite.

The results of these tests showed conclusively that in the winter time the pigs required added vitamin D after the body stores of the vitamin had been depleted. With the exception of two Duroc-Jersey pigs, all of the colored pigs, having access to the outside during the fall before being placed under confinement, stored sufficient vitamin D to protect them from rickets for periods of only four to eight weeks. White pigs of the Chester White breed and one Hampshire pig, which was nearly white, raised under the same environment as the colored pigs, were protected for approximately twice as long.

[91] Johnson, D. W., and L. S. Palmer, 1939. Individual and Breed Variations in Pigs on Rations Devoid of Vitamin D. *Jnl. Agr. Res.*, 58:12, pp. 929-40.

Vitamin D Supplement for Swine

A New Jersey experiment[92] showed that pigs receiving a vitamin D supplement not only were free from rickets, but reached an average weight of 196 pounds in 128 days on an average total feed consumption of 568 pounds per pig, whereas unsupplemented pigs reached a weight of only 186 pounds in 165 days, with a feed consumption of 895 pounds.

The results of this experiment have practical application wherever conditions are comparable to those under which it was conducted; that is, where pigs are confined and where more complete supplementation of the ration is not practiced. Undoubtedly the marked difference in growth and feed consumption between the control pigs and those which received supplemental vitamin D is attributable to some extent to the fact that there was definite evidence of vitamin D deficiency in the control animals, as shown by the occurrence of rickets in two pigs and low bone ash values.

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Rabies in Italy

In Italy there are 17 antirabic institutes and 31 antirabic dispensaries. Except for the four institutes of Bari, Bologna, Naples and Ravenna, where Pasteur's method is still used, phenol vaccine is used all over Italy, and Petragnani[93] devotes much of his article to the advantages in economy, convenience and safety of the phenol vaccine compared with Pasteur's method. Immediately after the war a marked increase in the incidence of rabies was observed; this was counteracted by strong measures against stray and improperly controlled dogs, which resulted in an immediate improvement. Tables and graphs are included; these show the fall in the number of cases treated from 2,156 in 1933 to 1,750 in 1935, and a similar fall in the number of bites reported from 9,000 in 1925 to 5,000 in 1935 (approximate figures). The decrease between 1923 and 1935 in the number of cases diagnosed and the proportion found positive is given in a graph, and the number of stray dogs captured is shown to have fallen from 71,857 in 1930 to 47,744 in 1935. Both the number of cases reported and the number successfully treated show a slight increase in 1935 over 1934.

[All continental European belligerents experienced large increases in the prevalence of rabies during and immediately following the World War; due of course to relaxation of animal disease regulatory measures. A similar condition can be expected to result from the present European war. War has ever been a great ally of diseases of both man and animals.]

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Actinomycosis in a Sheep

The author[90] states that this appears to be the first report of an actinomycotic infection in animals of the island of Antigua, B. W. I., and that it is the first occasion on which he has observed the disease in sheep. The affected animal was a low-grade, black head Persian ewe, about three years of age, with a ewe lamb. The owner had noticed that the ewe kept away from the flock, was going off in condition, and appeared to have an abscess on its jaw. He applied poultices, calling the veterinarian about five weeks after the first symptoms were noticed. At this time the ewe was scarcely eating; mastication being impaired by the structural changes in the jawbone. The animal showed distress on palpation of the jaw. There was a well-defined sinus, with a profuse, purulent discharge on pressure. The discharge was thick and gritty, and of a greenish-yellow color. The granules, when crushed, revealed microscopically the typical rosette form of the "ray fungus." Treatment consisted of curetting the area and packing the cavity with gauze soaked in tincture of iodine, combined with a daily oral dose of one dram of potassium iodide. The discharge had ceased after one week, but there was no improvement in the general condition of the animal, and the owner became alarmed and disposed of the ewe before further examination was possible.

[92] Skelley, W. C., 1939. N. J. Exp. Sta. Bul. 661.
[93] Petragnani, 1938. Protection contre la Rage en Italie. *Bul. Off. int. Hyg. publ.* 30, 568-76. Abst. in *The Vet. Bul.* 9:9.

[90] Hutson, L. R., 1939. *Can. Jnl. of Comp. Med.*, April.

The Immunization of Dogs Against Hookworm

Three litters of dogs, a total of 10 animals, were used to demonstrate the difference between the active immunity to the hookworm resulting from serial light infections in puppyhood and the partial refractoriness of mature dogs to initial infections. At autopsy many more parasites were found in the unprotected controls than in the dogs actively immunized as puppies. Furthermore, with one exception, the unprotected controls all succumbed to the experimental infections, whereas the actively immunized animals were scarcely affected. The authors[94] conclude that maturity and general good health are essential for the host to respond fully and quickly to the stimulus provided by invading worms. Thus the mechanism of immunity to helminths is analogous to that for viruses and bacteria.

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The Pathology of Shock

This is a review of the historical and current theories of shock arising as a result of trauma or surgical interference. Several of the proposed explanations have lacked confirmation by subsequent investigation. The results of experiments and observations made in testing theories leads Moon[95] to define shock as "a circulatory deficiency, not cardiac and not vasomotor in origin, characterized by decreased total blood volume, decreased volume flow and by hemoconcentration." It would appear that the circulatory deficiency results from stasis, leakage and dilation in the capillaries caused by the effects on their walls of substances absorbed from the injured tissues. The evidence does not support the idea that local loss of blood at the site of injury is an adequate explanation for shock, although such loss contributes to the circulatory deficiency.

[94] Otto, G. F., and K. B. Kerr, 1939. The Immunization of Dogs against Hookworm, *Ancylostoma caninum*, by Subcutaneous Injection of Graded Doses of Living Larvae. *Amer. Jnl. Hyg.*, Sect. D, 29, 25-45. Abst. in *The Vet. Bul.* 9:9, by A. L. Wilson.

[95] Moon, V. H., 1937. Shock, its Mechanism and Pathology. *Arch. Path.* 24, 642-63; 794-813. Abst. in *The Vet. Bul.* 9:9 by N. J. Scorgie.

Russian Mange Treatment

The author[96], who practices in Tel-Aviv, Palestine, reports four stubborn cases of mange (three demodetic, one sarcoptic, all old advanced cases on which many treatments had been tried and failed), which he treated successfully by the method originated by Professor Demianovici.

The patient is clipped and washed well with soap and water. After a few hours a 60% solution of sodium hyposulphite is applied carefully all over the body. When the skin dries it should be covered evenly with a white powder. If any areas have been missed the solution is applied to them. When all the surface is covered with the powdery hyposulphite, the body is gone over in the same manner with a solution of hydrochloric acid. Both applications are made with a brush, and a careful treatment requires about an hour.

Russian veterinarians state that it sometimes happens that one application is sufficient, but Doctor Gorovitz' cases required six treatments at three-day intervals, a total of 15 days for complete recovery.

It is stated that this method of treating mange has been introduced into all veterinary hospitals throughout Russia. Equally as good success in all kinds of mange is claimed with horses, camels, sheep and rabbits.

The reason for giving the treatment at three-day intervals is that the sulphur and sulphur dioxide released by the hydrochloric acid from the sodium hyposulphite, are active for this period only. No mention is made of a frequency of treatment determined by the life cycle of the parasites; i. e., two treatments at 14-day intervals which it appears might be as effective as six at three-day intervals. In the report no mention is made of trying other than the three-day interval, but it is inferred these frequent treatments hasten the growth of a lustrous coat.

[96] Gorovitz, C., 1939. The Use of Sodium Hyposulphite and Hydrochloric Acid in the Treatment of Mange. *The Vet. Rec.* 35:51, p. 1097.

Book Reviews

MEAT HYGIENE. *By Richard Edelmann,* Ph.D., Royal State Veterinarian of Saxony; Professor at the Royal Veterinary High School in Dresden. Seventh Revised Edition, by *John R. Mohler,* A.M., V.M.D., D.Sc., Chief, Bureau of Animal Industry, U. S. Department of Agriculture, and *Adolph Eichhorn,* D.V.S., Director Animal Disease Station, Bureau of Animal Industry. Cloth bound. 463 pages, 157 illustrations and 5 colored plates. Lea & Febiger, Philadelphia, 1939. $5.50.

This is a work on meat inspection. The authors justify the use of "hygiene" in the title because the work contributes to regulation of the meat portion of the diet of man, but it remains a discussion of meat inspection, and an excellent one. The first chapter deals with the whole subject of food animals and where each of the species is largely used, the parts that are consumed for food, their proportion to the whole carcass, means of identifying carcasses, transportation before and after slaughter, different methods of slaughter, etc.

The second chapter discusses meat and its constituents, taking up one by one each tissue. Tables are included giving the constituents of each, and many illustrations showing the location of all lymph nodes, glands and other organs, means for detecting fraudulent substitutions, etc.

Chapter III also deals with basic matters—the production, preparation and conservation of meat.

Taking up more specifically the duties of the meat inspector and methods of carrying them out, chapter IV is a copy of the regulations governing the meat inspection of the United States Department of Agriculture. Chapter V discusses the organization and methods of procedure of a meat inspection force. Chapter VI discusses decisions of the veterinary inspector and disposal of condemned meat. Chapter VII continues with abnormal conditions and diseases of food-producing animals, giving a description of the appearance of the flesh of immature animals, of those in advanced age, exhibiting sexual peculiarities, incomplete bleeding, etc., and a description of the means of recognition and disposal of the flesh of animals suffering from parasitic and non-bacterial diseases. A discussion of infectious diseases constitutes another chapter.

Chapters IX to XV deal with post-mortem changes of meat, examination and judgment of prepared and preserved meats, food poisoning, history of meat hygiene, abattoirs and stockyards, preparation and control of meat-food products, and chemical analysis of meat-food products, respectively. The whole constitutes a comprehensive work on meat inspection indispensable to the veterinarian interested in meat inspection and useful to all others, since there is no veterinarian but is asked at times concerning the wholesomeness of certain cuts or carcasses of meat.

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BRUCELLOSIS IN MAN AND ANIMALS. *By I. Forest Huddleson,* D.V.M., M.S., Ph.D., Research Professor in Bacteriology, Michigan State College. Contributing Authors: *A. V. Hardy,* M.S., M.D., Dr.P.H., Associate Professor of Epidemiology, De Lamar Institute of Public Health, Columbia Medical School; Consultant, U. S. Public Health Service; *J. E. Debono,* M.D., M.R.C.P., Professor of Pharmacology and Therapeutics, Royal University of Malta; and *Ward Giltner,* D.V.M., M.S., Dr. P.H., Dean of Veterinary Division and Professor of Bacteriology, Michigan State College. Cloth bound. 339 pages, illustrated. The Commonwealth Fund, New York, 1939. $3.50.

Whatever Huddleson says of brucellosis either in man or in animals must command attention, for he is the foremost authority on the subject. For more than 20 years he has been studying this subject in this country and abroad. In this work he had the coöperation of three outstanding authorities—Hardy of the U. S. Public Health Service, Debono of the University of Malta, on the island that protests the distinction given it by the name "Malta fever," and Giltner, who has contributed much to a better understanding of veterinary aspects of public health and more to the solution of brucellosis in animals than is generally appreciated.

The discussion begins with this attention-compelling statement from Nicolle: "Mediterranean (undulant) fever is in the

course of evolution, and is tending to become chronic. It is a malady which, on account of its manifestation of chronicity, will become one of the most common and stubbornest diseases. . . . Mediterranean fever is a disease of the future."

Two sections of this work—Methods of Isolating Brucella and Differentiation of the Species of Brucella—possess little interest for the average veterinarian. All the remainder of the book is of keen interest and much practical value. Even the section on Brucellosis in the Human concerns him personally since brucellosis is an occupational disease of veterinarians, all too common as an infection and even more prevalent as an allergy. Other sections deal with the history and distribution of brucellosis, brucellosis of animals, the laboratory diagnosis of brucellosis, and eradication or control of sources of brucellosis (by Giltner) in which it is stated that "brucellosis [in animals] is perhaps three times as prevalent as was tuberculosis at the time its eradication was begun."

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THE SPRINGER SPANIEL. *By Maxwell Riddle*, Breeder, Judge and Journalist. Cloth bound. 158 pages, illustrated. Judy Publishing Co., Chicago. $2.00.

Few breeds of dogs have surged into popularity so rapidly as has the springer spaniel. Twenty years ago not a springer was seen at a dog show. Today the springer is one of the most popular hunting breeds in the United States and Canada.

This work presents the origin and development, the standard for type and breeding, the springer in the field and at the dog show, the training for active work in the field as a hunter, as well as conditioning for winning show ring prizes, plus an extended discussion of the anatomy, health, feeding, housing, training and kennel management of the breed—a picture of the springer past, present and future—for the breeder and exhibitor, and none the less for the pet-dog owner.

The chapters on whelping and care of the dam evidence common sense and good observation, although no technical knowledge. The chapter on diseases is commendably short and predicated upon the following sound statement:

The situation has changed greatly within the last two decades until today, with few exceptions, veterinary services are reasonably available in all places.

The desirability of possessing information for maintaining the dog's health, avoiding careless errors, and doing what should be done in cases of first aid and emergency still exists; but the layman dog owner and the breeder who know most about the physical needs of the dog, are the first to patronize the veterinarian.

It is nothing other than fair play both to the dog and the doctor to bring your ailing dog in good time to the veterinarian rather than hold off until the condition of the dog is such that even the best professional skill cannot save him. Not a few veterinarians have been damned for the death of dogs when in truth the owners should suffer their own damnation.

The author's limited experience with canine disease is revealed by a single sentence—"Rabies is so rare that it can be dropped from consideration." The science of nutrition is unexplored territory to him and in the chapter on feeding he muddles considerably; *e. g.*, "A truly balanced diet for the dog includes the necessary vitamins and therefore, one need worry little about them." He does not tell where or how to obtain the "balanced diet" or what it is.

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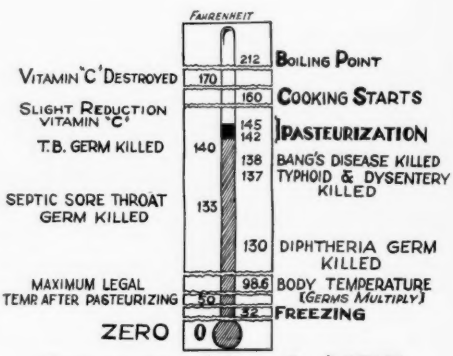

—*Army Veterinary Bulletin*